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# **THE ADIRONDACK LAND MARKET:**

## **The Land, Its Value, Its Buyers**

### **(1968-1983)**

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### SUMMARY

The Adirondack region of New York State is an area whose economic possibilities and limitations have always been closely tied to its land and natural resources. It is the forest and mountains, the water and minerals, the regional beauty and accessible wilderness which have attracted most businesses, visitors, and residents to the Adirondacks, just as the ruggedness and relative isolation have kept others away. The physical land resource is endowed with economic consequence in the land market. It is there that values are assigned, ownership privileges exchanged, and land is transferred to persons able to put it to its most "productive" use.

In this study four important elements of the Adirondack land market are depicted. They are 1) the characteristics of transferred land, 2) the characteristics of owners who have acquired land since 1968, 3) the uses to which the acquired land has been put, and 4) the factors which contribute to land values. Most of this paper is devoted to an econometric examination of the fourth point. Of special note is the finding that the values of Adirondack land have not appreciated equally across all the regional land use zoning classes. In general terms, the concern of this study is with how the link between land and owner is forged in a socially defined marketplace - who participates, what kinds of land are involved, and how land use policy affects both land and owners.<sup>1</sup>

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<sup>1</sup> An executive summary of this paper is available from the author. A companion study profiles all Adirondack landowners, their property, and their attitudes towards land use controls, regardless of the date of parcel acquisition (Geisler, et. al., The Adirondack Landowner Survey, Rural Sociology Bulletin 145, Cornell University, April 1985.)

## 1. INTRODUCTION

Land appeals to a wide variety of people for many different reasons. Most of these reasons have economic significance in the sense that they are signposts to the value of the land. This economic value may arise where the land resource provides raw materials for the production of other goods, or it may arise where the land benefits a "consumer" directly. For example, Adirondack land provides homesites for hundreds of thousands of permanent and part-time residents, in many cases also serving as a major store of their personal wealth. It supplies the raw material inputs for the mining and timber industries, and supports significant pockets of agricultural activities. The rivers and lakes of the region collect the waters which provision other parts of the state. Adirondack land offers unique opportunities to hunters, snowmobilers, hikers, skiers, boaters, other recreationists, and all the businesses which cater to them. And much of the land sustains a valued and irreplaceable reservoir of nature free of the obvious marks of human intervention. Were the land market to function ideally, all of these potential economic values would be expressed in the market price of land.

Although a wide variety of people benefit from the Adirondack land resource, it is the owner of the land for whom the dollar value of the land should be highest, at least in theory. Otherwise the owner would presumably be willing to sell the property to someone else who placed greater value on it. In actuality, whether or not the current owner is truly the person valuing the land most highly is a complex and even philosophical question. The existing distributions of property rights and of incomes mediate between the personal, abstract values placed on land and the dollars that any individual would sacrifice to either gain or retain the benefits of landownership. Moreover, it is not always necessary to be the owner of a piece of property in order to gain access to, or even control over, some of its benefits (eg. a view of it). The purchaser of a piece of property will sensibly be willing to pay for only those of its characteristics which must be bought to be enjoyed.

The markets for landed property are particularly complicated. This is because, unlike most other economic goods such as paper cups or apples or refrigerators, land is fixed in location. It cannot be reproduced at will, nor can it be used up or consumed in the normal sense of that term. Unlike production line products, each parcel is in many ways uniquely distinguishable from other parcels. These qualities of land often make comparisons of property and property values difficult, as any realtor or tax assessor can attest. For this reason, the amount of information prospective buyers and sellers can find about sales of "similar" properties is often insufficient to guarantee that a fair, "competitive" market price is agreed upon.

The price paid is in any event not determined in the same way as for most other goods. Essentially every buyer of record albums can expect to pay the same price as anyone else at a given store. The buyer will probably decide which album to purchase and then shop around for the best deal. Each buyer of land, on the other hand, will very likely bargain with the seller over the price of a parcel of desirable property. Any price that is greater than the minimum amount the seller will accept and less than the maximum amount the buyer will offer is a possible sales price. The bargaining powers or abilities of the parties involved will help set prices in a way which can be reminiscent of price setting in some obviously noncompetitive markets. Every seller of land holds a small degree of monopoly power when there are no identical parcels on the market to be turned to by the prospective buyer.

All of these considerations suggest that caution should be exercised in approaching and interpreting economic analyses of land values. Traditional tools of microeconomic analysis are prone to misapplication when applied to land sales. However, at least one fruitful analytic approach acknowledges some of the unusual aspects of land and is commonly applied in land price studies. This approach, "hedonic regression analysis", specifically recognizes that land (and many other products) are not homogeneous. It assumes that property is valued as a whole only through a summation of the values placed on its distinguishable characteristics, such as those identified by this research in the Adirondack region.

The first empirical section of this study will report on an application of hedonic regression techniques to Adirondack land values. It asks which characteristics of the land increase or decrease its dollar value for current or potential landowners. The actual prices paid for the purchase of Adirondack properties are the measure of value analyzed. As is explained below, the analysis pays special attention to one particularly controversial characteristic of the land - the zoning classification into which it has been placed by the State of New York. The question of whether or not zoning has had a causal impact on land values is addressed.

The second empirical section of this report shifts the focus away from a strict examination of influences on land values and towards a broader perspective: the general circumstances of landownership. From this perspective, market prices are important as a barrier to becoming landowner and as a measure of landed wealth. But prices are only one part of this story. Land tenure and land use concerns often lie behind land values. Who benefits from the land? Who decides how it is used? Any recognition of the central role land resources play in defining the character and well-being of the Adirondack region raises these questions too. The report's focus shifts to ownership

because, given the remarkable physical qualities of Adirondack land, both its uses and the access to its benefits are primarily determined by who its owners are, and by the dimensions of the socially created balance between the rights and responsibilities of ownership.

Before turning to the empirical results, a brief digression is presented on the major public forces determining the balance of Adirondack landowner rights and responsibilities.

## 2. THE ROLE OF THE NEW YORK STATE

### 2.1 Policy Background

A profile of the conditions of Adirondack landownership contains some unusual elements. This is primarily due to the history of the role played by the State of New York, which has had a major influence on landownership in two ways. First, the State is the largest single landowner in the region. Extensive State ownership was originally consolidated under a coherent management system with the creation of the State Forest Preserve one hundred years ago (1885). The Adirondack Park was created seven years later, in 1892, to include the northern Forest Preserve lands within its domain. The Park expanded over time. New York State owns and directly controls 38% of the six million acres within its current boundaries. Almost all of this land is obliged under the state constitution to be maintained as land that is "forever wild". The State slowly continues to accumulate Forest Preserve lands through purchases, donations, and tax sales. A purchase fund was most recently replenished by the voters of the state in 1972.

The second State influence is comparatively new. In spite of its long history of concern about land in region, before 1971 the State exercised relatively little control over the private landholdings scattered throughout the Park. In that year the Adirondack Park Agency (APA) was legislatively established and charged with the mission to develop, encourage, implement, and enforce land use planning on private land in the region. Since 1973 the APA has had direct zoning oversight over the 3.7 million acres of Park land which are still privately owned.

The establishment of a regional body able to supercede the land use control authorities of local governments is unusual, though not unique, in the United States. The movement towards the centralization of land use controls was strong during the early 1970's throughout the nation. The Adirondack legislation was typical in that it grew out of concerns about the ability of local governments to manage threats to the environmental integrity of the region as a whole. In the Adirondacks most of the traditional zoning powers can be returned to local governments, but only if they adopt APA approved land use plans. In practice, the State retains a major regulatory and planning

presence at the local level. State policy is therefore able to bear directly on private as well as public uses of Adirondack land, and consequentially on the distribution of the land's benefits.

The 1973 legislation that transferred primary authority over land use controls from local to state government (i.e., the APA) also formulated a detailed zoning mechanism in the Adirondack Park Land Use and Development Plan (the Plan). Specifically, the Plan set up a system of regulations for six zoning categories covering all privately owned land in the Park. The Adirondack Park Agency was given authority over the issuance of permits for specified development activities in each of the zones.

Although the actual details of the Plan are quite complex, its most salient single feature is the regulation of building densities. The density regulations are minimal in the Industrial Use land class and in the designated "growth center" areas (Hamlet land class). Land in Moderate Intensity areas can be built up to one "principal building" for every 1.3 acres on average. Land in Low Intensity areas requires an average of 3.2 acres per principal building. Most restrictive are the regulations for Rural Use land, where an average of 8.5 acres must accompany the addition of each principal building, and for Resource Management Land, where a parcel must include at least 42.7 acres for each additional building. Clustering of buildings is encouraged.

The restrictions on Resource Management and Rural Use land are among the most stringent in the country. For many landowners, the Adirondack Land Use and Development Plan was the first planning or zoning authority that any level of government had exercised over their property. Within the space of a few years landowners went from a situation in which most could "do as they wished" with their property, to one in which they had to apply for permission from an executive agency of state government if they wished to pursue a range of land use activities.

Not surprisingly, both the APA and the Plan have elicited strong feelings of support and opposition since their inception. The right of the state to assume a planning role usually left to (often reluctant) local governments is at the heart of the controversy. However, the impacts on individual landowners and the possible general economic repercussions of the Land Use Plan have been a subject of ongoing debate. Many Adirondack residents continue to express concern that the land use controls have had an adverse impact on economic activity in general and on land values in particular. In spite of strong feelings on the subject, actual evidence is sparse. One legislatively mandated study on this subject had to be abandoned in the mid-1970's due to lack of available evidence and adequate funding to develop it. Only one other previous study has explicitly and empirical-

ly addressed the issue.<sup>2</sup> The results of the present study will not completely resolve the debate. However, the results will help to put many of the arguments in perspective, and to confront them with the land transfer data actually observed in the 1968-1983 period.

## 2.2 Measuring the Impact of Land Use Controls

The first empirical section takes up the question of zoning's impact on land prices. The parcel's zoning class is treated as one of several land characteristics that might influence price. The land transfer data do not conclusively implicate APA zoning regulations as an important influence on price. Indeed, no one can truly know what would have happened to the Adirondack land market in the absence of an APA or Land Use Plan. Instead of making a comparison of the situation existing with the Plan to what would have happened to the same area without it, we are forced to substitute a comparison of what was happening before the Plan existed to what has happened since. In addition, we can compare what has happened to parcels in the Park with what has happened to similar parcels outside the Park.

Evaluation of the effects of the Plan proceeds with a look at differential changes between land use zones over time. The presumption is that, because the regulatory stringency of the Plan varies by zone, there will be different impacts on land use and land prices in each zone, where land outside the Park is considered as a special "zone". The practical problem is to associate the zonally defined effects strictly with impacts of the Plan.<sup>3</sup>

## 3. EMPIRICAL RESULTS

Most of the data analyzed in this report comes from a questionnaire which was returned by owners of 1197 randomly selected parcels of Adirondack land. Note that parcels, not owners, were selected. The returned questionnaires represent 66% of the total mailed out. Parcels were chosen from 1982 versions of the twelve Adirondack county tax assessment roles. General results derived from this sample should be representative of all privately owned, fully taxable parcels acquired between 1968 and 1983 if found within the 105 towns in or immediately adjacent to the Adirondack Park (see map on p. 7). Because owners of parcels including a structure on them were more likely to return the

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<sup>2</sup> Robert C. Anderson and Roger C. Dower. August 1980. "Land Price Impacts of the Adirondack Land Use and Development Plan", American Journal of Agricultural Economics. Vol. 62, #3.

<sup>3</sup> Appendix I gives a discussion of the conceptual problems that complicate this task.



+ + + GAINED 5% OR MORE FROM 1970 TO 1980  
 \ \ \ LOST 5% OR MORE FROM 1970 TO 1980  
 □ CHANGED LESS THAN 5%

A map of the Adirondack Park region in New York State. The park is shown as a large, irregularly shaped area in the northern part of the state. It is bordered by Quebec (Que.) to the north, Ontario (Ont.) to the northwest, Vermont (Vt.) to the northeast, New Hampshire (N.H.) to the east, Massachusetts (Mass.) to the southeast, Connecticut (Conn.) to the south, New Jersey (N.J.) to the southwest, and Pennsylvania (Pa.) to the west. Major cities and locations marked include Montreal, Quebec, Toronto, Rochester, Buffalo, Syracuse, Albany, New Haven, and New York. Lake Ontario is also labeled. The text 'ADIRONDACK PARK' is prominently displayed within the park's boundary.

questionnaire, the uncorrected results may be biased. The existence of the bias was detected in the results of an abbreviated follow-up survey of nonrespondents. Where this bias was believed to be significant, compensating measures were taken.

The sixteen year period between 1968 and 1983 was chosen in order to include parcels acquired both before and after the implementation of the Land Use Plan. However, the most recent transfer of ownership for each parcel was the only one about which information was collected. This is a consequence of the fact that assessment roles only list information about the current status of parcels. Getting a complete list of parcel transfers back to 1968 for a region of this size would have been expensive, if not impossible, since computerized records are incomplete. Even if possible, it would have been extraordinarily difficult to locate and send a questionnaire to the earlier purchasers of such property. If a parcel did transfer ownership more than once in the period under consideration, the circumstances of the earlier transfer are unknown.

### 3.1 Hedonic Regression Results: What Influences Property Prices?

#### 3.1.1 Background

The characteristics of land parcels that exert an important influence on property prices generally include 1) the physical attributes of the land, 2) the physical and quality attributes of any structures on the land, 3) the important locational attributes that describe the neighborhood or vicinity in which the parcel is found, and 4) any land use restrictions which apply to the property. When sales prices are compared statistically using hedonic regression analysis, these factors usually best explain the price variations between parcels. Hedonic analysis permits the grouping and comparison of parcels which are equivalent in all but one respect - for example, the zoning class it is in. The question can thus be asked, for example, how the price of a given parcel would have differed if it had been located in an area zoned differently.

Parcels which had single family homes or cottages on them when purchased were analyzed separately from a second group of parcels including all the undeveloped land and some with structures not dedicated to single-family residences. This distinction was maintained for two reasons. First, the separation erases any bias introduced by the higher response rates about parcels with single family homes on them. Second, density restrictions should have different effects on developed and undeveloped parcels.

Finally, the regression analysis is restricted to the approximately two-thirds of the returned questionnaires which were about parcels purchased on the open market. The restriction to open market parcel purchases was made because the transfer prices of such purchases were most likely to be reflective of the full and current exchange value of the parcel. About 800 open market transactions were sampled. However, when the cases were divided into 1) purchases made before or after the adoption of the Plan, 2) purchases including or not including single family residences, and 3) six APA zoning categories plus land outside the Park, few cases were left in some of the most interesting categories.<sup>4</sup> This necessitated the combination of certain land use classes into groups for the purposes of this analysis.<sup>5</sup>

### 3.1.2 General Interpretation of Regression Results

The results of the hedonic regression analysis can be found in Table 1. The variable to be statistically "explained" is the price (expressed in 1982 dollar equivalents) paid for the purchase of the parcel. The other variables are identified in Appendix II, and statistically described in Appendix III. For both regressions, a logarithmic transformation of the purchase price permitted the best fit of the model to the data.<sup>6</sup> As Table 1 shows, the model fitted to the sample without single family houses on it accounts for slightly more price variability than does the other model (R-square of .53 versus .46). If the model

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<sup>4</sup> See Appendix VI.

<sup>5</sup> Parcels which belonged to the Resource Management and Rural Use classes at the time of purchase were combined into a "Tight Control" group, while the remaining land use classes in the Park were combined into a "Loose Control" group. The "Outside" group was reserved for parcels entirely outside the boundaries of the Park. Although logic and a preliminary examination of the data made this aggregation seem plausible, it effectively averages out any differences between the zones that are lumped together. Thus, any differences between (e.g.) Rural Use and Resource Management price histories will be masked. Parcels purchased before the existence of the Plan were grouped according to the zoning class to which the parcel belonged as of 1982.

<sup>6</sup> The most common measures of "goodness-of-fit" are the R-square and adjusted R-square. The former figure tells us what proportion of the variability in prices is accounted for by the regression models. The latter figure gives us a similar measure adjusted for the number of parcels on which the results are based. These measures were among several considerations which went into deciding on the "best" model.

TABLE 1

Hedonic Regression Results for Parcels With and Without Single Family House or Camp:  
Open Market Sales Between 1968-1983 in the Adirondack Study Region

VARIABLE	WITH SINGLE FAMILY HOUSES OR CAMPS (N=326)		WITHOUT SINGLE FAMILY HOUSES OR CAMPS (N=455)	
	COEFFICIENT VALUE	STUDENT- T	COEFFICIENT VALUE	STUDENT- T
INTERCEPT	9.789*	30.00	8.642*	27.42
<u>Physical characteristics</u>				
ACRES	.011*	3.50	.028*	6.50
ACRESSQ <sup>1</sup>	-.000029***	-1.90	-.000065**	-2.51
LRFRONT (1=yes)	.297*	3.09	.672*	4.51
LAKEVIEW (1=yes)	-.013	-.10	.276***	1.66
RDNONE (1=yes)	-.763*	-2.87	-.446**	-2.00
PUBSEWR (1=yes)	.	.	.413**	2.01
OUTHOUS (1=yes)	-.314**	-2.31	.	.
SPRINGH20 (1=yes)	-.240***	-1.74	-.402**	-2.07
STEEP (1=yes)	.	.	-.208	-1.16
CABLE (1=yes)	.	.	.277**	2.06
PHONE (1=yes)	.238*	2.64	.923*	5.86
WOODLAND (1=yes)	.157***	1.80	.	.
CROPLAND (1=yes)	.	.	-.282	-1.04
BSNESLND (1=yes)	.	.	.594**	2.58
<u>Locational characteristics</u>				
DISHIWA (miles)	-.007*	-3.30	-0.002	-.89
DISCITY (miles)	.003	1.38	.	.
DISVIL (miles)	-.006	-.70	.031	.89
VILSQ <sup>1</sup>	.	.	-.003	-1.23
SOUTHERN (1=yes)	.	.	.111	.89
WESTERN (1=yes)	.	.	-.239****	-1.52
NEARFP (1=yes)	.165**	1.98	.248**	2.14
TAXRATE (percent)	-.030*	-3.78	-.025**	-2.27
<u>Transaction characteristics</u>				
PORTION (1=yes)	.	.	-1.419*	-7.33
YEAR (1 to 16)	-.021	-1.36	.	.

(CONTINUED NEXT PAGE)

TABLE 1 (continued)				
VARIABLE	WITH SINGLE FAMILY HOUSES OR CAMPS (N=326)		WITHOUT SINGLE FAMILY HOUSES OR CAMPS (N=455)	
	COEFFICIENT VALUE	STUDENT- T	COEFFICIENT VALUE	STUDENT- T
<u>Building characteristics</u>				
BLDG (1=yes)	.	.	.437**	2.38
CAMPS (no.)	.410*	2.71	.	.
HOUSES (no.)	.400*	2.16	.	.
BATHROOMS (no.)	.445*	3.21	.	.
BATHSQ <sup>1</sup>	-.084**	-2.31	.	.
BEDROOMS (no.)	.017	.54	.	.
OTHRROOMS (no.)	.049****	1.54	.	.
SFFS (square feet)	.0002*	2.89	.	.
SFFSQ <sup>1</sup>	-7.15E-9**	-2.27	.	.
BLDAGE (years)	-.006*	-5.03	.	.
FIREPL (no.)	.316*	4.58	.	.
WOODHEAT (1=yes)	-.236**	-2.53	.	.
<u>Zoning class and time period (NEWLOOSE is base)</u>				
NEWOUT (1=yes)	.295*	2.76	.177	1.12
OLDOUT (1=yes)	.101	.57	-.118	-.55
NEWTIGHT (1=yes)	.234***	1.86	-.053	-.26
OLDTIGHT (1=yes)	.034	.17	.061	.29
OLDLOOSE (1=yes)	.232	1.33	.228	1.37
Dependent variable: PRICE, the natural logarithm of price in 1982 dollars				
R <sup>2</sup> =.53		ADJ-R <sup>2</sup> =.48		
		R <sup>2</sup> =.46		ADJ-R <sup>2</sup> =.43

N.B. A dot (.) means that the variable was not included in that model.  
See Appendix II for explanation of variable labels and Appendix  
III for a statistical description of the variables.

<sup>1</sup> These variables are the squared values of the preceding variable.

\*, \*\*, \*\*\*, \*\*\*\* The asterisks indicate the Student t-test significance levels for a two tailed test of .01, .05, .10, and .15 respectively. The statistical tests are intended to be illustrative only. It is likely that they overestimate the significance of the relationships because of the preliminary model building which was undertaken. Note that t-tests cannot legitimately be performed sequentially on a series of variables. The coefficients therefore are best interpreted as a measure of the relative strength of the relationships between prices and the variable in question. In sum, the fewer the stars and the larger the "t" value, the stronger the relationship of the variable with price and the more confidence in its importance for the land market.

run for the parcels without single family houses on it is amended by dropping the single variable indicating the presence of any kind of structure (BLDG), and then fitted to a subsample of wholly undeveloped parcels only, the R-square drops even further, to .32 (adjusted R-square of .26).<sup>7</sup> These results suggest that we have done a better job of modeling the influences on price for the parcels with residences on them. It was in fact expected that the market for the relatively expensive residential parcels would be easier to model. For both economists and prospective buyers or sellers, the value of houses is probably easier than the value of land to compare and parameterize, and therefore to model.

It is a matter of opinion whether this degree of explanatory power is "good" or not. Some property value studies in urban areas have been able to explain over 80% of price variability. Previous regression studies of Adirondack land values have been able to explain prices about as well as here or slightly better.<sup>8</sup> A study of rural land values in the regionally zoned Pinelands region of New Jersey was only able to explain about 40% of the price variability there. In almost all land value studies there is substantial amount of observable price variability which is not explained by econometric models. This means either that economists have been unable to discern and model the logic of certain aspects of land pricing, or there is in fact a substantial lack of regularity in the way land prices are determined. Relatively low levels of explanatory power are generally expected in diverse rural areas like the Adirondacks, where a well defined competitive market is often absent.

Given the logarithmic transformation of the dependent variable (purchase price), the coefficient values can be interpreted in proportional terms.<sup>9</sup> Take the coefficient on ACRES for the WITH SF HOUSES regression as an example. The coefficient .011 means that for every one unit (acre) increase in the size of the parcel, the price of the parcel would increase by 1.1% if all other characteristics of the parcel remained the same. For a

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<sup>7</sup> See Appendix IV.

<sup>8</sup> One such study, completed by a Cornell University researcher in 1975, modeled five categories of Adirondack property. The R-square on a model developed for seasonal residences was relatively high. The fit for the sample of undeveloped "rural" parcels was quite poor, however. (Robert Craig, Thesis, 1975) The Anderson and Dower study of Adirondack zoning mentioned in footnote two employed a non-comparable regression technique.

<sup>9</sup> This result can be derived with calculus by taking the partial derivative of the logarithm of price with respect to any of the explanatory variables.

typical parcel costing about \$34,000, an additional acre would be worth approximately \$375. Similarly, the larger .028 coefficient value on ACRES in the sample without single family houses means that every one acre increase in the size of those parcels is accompanied by an average 2.8% increment to price, all else held constant. A typical parcel costing \$8,000 would thus increase in price by about \$225 with an additional acre.

Actually, for those variables like acreage (ACRES) that also have a quadratic term (ACRESSQ) in the model, the interpretation is slightly more complicated.<sup>10</sup> In both of the models presented all of the quadratic term coefficients are negative and small relative to the coefficient on the first (linear) term. This means that whatever the initial impact on price may be of adding another unit of these characteristics, the size of the impact diminishes (or gets more negative) slowly as more is added. This makes sense. The proportional impact on price due to an increase in the size of a parcel from 0 to 1 acres is surely greater than from 1000 to 1001 acres. However, the small coefficients on the squared terms imply that the per acre costs alter by only a few dollars in the typical smaller size and price ranges.

The interpretation of the coefficients on categorical variables (those with a 1=yes describing them) is slightly different. The coefficient on these variables shows how much the price of a parcel that has the given attribute differs from the price of a parcel identical to it except for the absence of the attribute. For example, the coefficients on the variable indicating the presence of lake or river frontage (LRFRONT) are .297 in the first regression and .672 in the second. This means that for parcels including a single family home or camp, the price of a parcel with frontage averages 29.7% higher than for parcels without frontage, all else equal. The proportional impact of frontage on parcels without such structures is even greater, adding 67.2% on average to the price of an otherwise similar parcel. For our typical \$34,000 and \$8,000 parcels, the presence or absence of water frontage therefore influences price by approximately \$10,000 and \$5,400 respectively.

The central group of variables for this analysis, those under the rubric "Zoning Class and Time Period", also require special explanation. As mentioned, parcels were distinguished by whether they were purchased before or after the Plan began to be implemented (NEW v.s. OLD), and by which of the three land use control groups they belonged to (OUT, or outside the Park; TIGHT, or in the "Tight Control" group, and LOOSE, or in the "Loose Control" group). There are therefore six possible combinations

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<sup>10</sup> The other variables including quadratic terms are the distance to a village (DISVIL, VILSQ), the number of bathrooms (BATHRM, BATHSQ), and the square feet of floor space (SFFS, SFFSQ).

of zoning group and period of purchase.<sup>11</sup> These six combinations are treated in conjunction in the regressions. One combination, parcels in the "Loose Control" group acquired after implementation of the Plan (NEWLOOSE), is not explicitly included in the regressions because it serves as a base against which the prices in the other combinations are measured. Thus, for the WITH SF HOUSES sample, the price of a parcel in the NEWOUT group is 29.5% higher on average than for parcels in the base group, all else held equal. The price of a parcel in the NEWTIGHT group is also seen to be 23.4% higher than those in the base group on average, all else equal.

### 3.1.3 The Effect of the Land Use Plan on Property Prices

For both regression models, the only zoning coefficients which differ from zero with any statistical significance are the two just mentioned.<sup>12</sup> In other words, the only differences in parcel value that are captured in the zoning variables (all else held equal, of course) seem to be in the WITH SF HOUSES sample. There the value of parcels in the "Loose Restriction" group acquired after the implementation the Plan seems not to have kept up with the value of post-Plan purchases both outside the Park and in the more restricted land classes.

This information can be expressed in a more understandable format. If there has been an effect of zoning on land prices, the impact should show up in rates of price appreciation which differ by zones. Table 2 expresses the hedonic regression coefficients as changes measured from the pre-Plan average price to the post-Plan average price. The first thing to note from Table 2 is that although the magnitudes of the new coefficients suggest between 10% and 30% changes over time, none of them are distinguishable from zero with an acceptable degree of statistical

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<sup>11</sup> These are listed in Table 1 as OLDOUT, NEWOUT, OLDTIGHT, NEWTIGHT, and OLDLOOSE. NEWLOOSE does not appear in Table 1 for reasons explained in the text.

<sup>12</sup> The Student t-statistic is a measure of significance. It compares the size of the coefficient to the precision with which it has been estimated. The larger the t-statistic, the greater is our confidence that the coefficient does not differ from 0 strictly by chance. The asterisks in Table 1 denote conventional benchmarks of confidence. For example, one asterisk indicates that that there is only one chance in a hundred that the corresponding coefficient differs from zero (or the base zoning category for the zoning variables) only by luck. Larger numbers of asterisks indicate progressively less confidence that random factors have not led to seemingly significant results. The coefficients with no asterisks next to them are much below the levels of confidence with which most economists are comfortable.



TABLE 2

Different Price Appreciation in Different Zoning Classes for Parcels With and Without Single Family Homes (Post-Plan average price minus Pre-Plan average price)

ZONES	APPRECIATION RATES	T-STATISTIC
<u>Parcels including single family homes or camps</u>		
Outside Park	19.5% (\$6,648)	1.15
Loose Restrictions	-23.2% (-\$7,909)	-1.33
Tight Restrictions	20.0% (\$6,818)	.93
<u>Parcels not including single family homes or camps</u>		
Outside Park	29.5% (\$2,379)	1.45
Loose Restrictions	-22.8% (-\$1,839)	-1.30
Tight Restrictions	-11.4% (-\$919)	-.49
<p>Note: The appreciation rates show the percentage increment to price for the parcels in each zone through comparing average "Before Plan" with "After Plan" prices, non-zoning parcel attributes held constant. They are calculated from the coefficients in Table 1. Dollar values in parentheses are evaluated for the median parcel values found in Appendix III.</p>		

confidence. However, this does not necessarily mean that the zonal effects on prices are trivial. Even though appreciation rates may not differ significantly from zero, they may differ from each other.

There is a notable difference between the zones where prices have gone in a positive direction and those where prices have gone in a negative direction. The results shown here signify that the price performance of any given parcel would have been "better" during the period in question (assuming price increases are good) if the parcel was outside the Park rather than in the "Loosely Restricted" zones. But an average property under the "Tight Restriction" zoning regime did no worse than property outside the Park altogether - if the parcel included a single family home at purchase. If a single family home was not included at purchase, then the price of "Tightly Restricted" parcels went in precisely the opposite direction, and approx-

imates the decline in the value of the "Loosely Restricted" parcels.<sup>13</sup>

The inclusion in the WITHOUT SF HOUSES sample of parcels containing non-single family residential structures may confuse some interpretations of the results. When the regression was performed on the sample purged of all parcels including structures (see Appendix IV), the following price differentials were obtained: 17.5% for parcels outside the Park, -34.2% for "Loose Restriction" parcels, and 6.4% for "Tight Restriction" parcels. These results are more like those for the WITH SF HOUSES sample. The 6.4% price appreciation observed on wholly undeveloped parcels is not negative. However, it is still small in relation to the appreciation for the corresponding WITH SF HOUSES parcels. Apparently, the largest price declines for "Tightly Restricted" properties in this particular sample were for the assortment of duplexes, motels, commercial properties, and non-single family residences that are included in the full WITHOUT SF HOUSES sample.

How might these results tie into the logic that zoning has had an effect? One hypothesis is that regulations have had a depressing effect on the economy of the Park as a whole. The depressed economy should lead to both reduced demand for homes and land and possibly an increase of supply - more properties for sale. If so, the values of land inside the Park should not keep pace with the values of land outside the Park. Cautious readers will point out that the effect on land values of a regional recession would not necessarily adhere strictly to the boundaries of the Park. In this case, the parcels sampled from just outside the Park boundaries would not be as useful as a base of comparison. Total effects of the Plan on land values would be underestimated. Disregarding this complication, the observed increases in value for parcels in the "Outside Park" category and decreases for those in the "Loose Restriction" category confirm the recession logic. The observed differences between parcels in the "Outside Park" and "Tight Restriction" categories are less obviously in concert with the logic. The results which do seem to fit in (for the full WITHOUT SF HOUSES sample) become suspect when the subsample of only undeveloped parcels is analyzed, given the 6.4% increase for "Tight Restriction" parcels there. In sum, the parcels subject to the most restrictions do not necessarily

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<sup>13</sup> The F-test, a relative of the Student t-test, confirms these impressions statistically. For the WITHOUT SF HOMES sample, the null hypothesis that price appreciation was equal across all three zoning groups could be rejected at the 87% confidence level. ( $F=2.05$  with 2 and 429 degrees of freedom for the numerator and demoninator respectively.) For the WITH SF HOMES sample, the same null hypothesis could be rejected at the 97% confidence level. ( $F=3.66$  with 2 and 295 degrees of freedom.)

perform any worse than parcels not directly affected by the Plan.

An embellishment to the previous hypothesis could rescue some consistency. The density restrictions should have especially strong effects in the Resource Management and Rural Use land use classes. They could create an artificial scarcity of housing in these tightly restricted zones. This would be consistent with the price appreciation observed for the "Tight Restrictions" group in the WITH SF HOUSING regressions. On the other hand, the density restrictions limit the development potential of properties in the tightly restricted zones. It therefore seems plausible that the demand for undeveloped property, and the demand for some kinds of nonresidential or commercial properties would also be curtailed. This would be consistent with the price depreciation observed on the "Tight Restrictions" group of parcels without single family houses or camps on them.

In summary, if one is willing to 1) accept the "Outside Park" parcels as a viable control group, 2) say that the Plan's generally depressing impacts on economic activity in the region have predominated in the "Loosely Restricted" zones, and 3) say that the more parcel specific effects of density zoning have predominated in the "Tightly Restricted" zones, then it is possible to fit our zoning variable results into a consistent causal framework.

However, as implied in Appendix I, a number of other outcomes could have had causal explanations constructed for them. Part of what remains at issue is whether the zoning variables measure only the effects of zoning regulations. It could be argued, for example, that more general economic forces would have affected each land use area differently in any event. Urbanization pressures from the cities surrounding the Adirondack region might have put greater demand pressure on parcels just outside the Park boundaries than on parcels in the more remote land that would be more often put into "Tightly Restricted" land classes, for example. In fact this does not appear to be supported by the data, however. Experiments with variables using the distance of the parcel from the nearest city, and also the rate of 1970-1980 population growth in each of the townships, would have partly detected this kind of effect. But no statistically significant effects of these variables on price were seen.

A second macroeconomic alternative should be considered. Not all regional influences on the economy originated with the Land Use Plan. Just after the Adirondack Land Use and Development Plan was adopted, the OPEC oil embargo was imposed. A serious recession began, which was to be followed by an even deeper recession during the early 1980's. Several states close to the Adirondacks have been among those hit especially hard, as older

industries have declined. In contrast, the years before the early 1970's, while not recession free, culminated an extended period of economic growth in the U.S. Therefore the date which separates the "Before Plan" purchases from the "After Plan" purchases also marks a major change in the economy as a whole. Unless it can be argued that this change influenced the demand and supply for land equally across all zoning classes in the Adirondacks, the influence of land use regulations on land prices cannot be independently distinguished with a simple hedonic regression. But it is quite plausible that a recession would have different impacts on the demand for land in the Hamlets or growth centers than it would on the demand for Resource Management land in the back country.

There are two ways in which national forces may already be independently if crudely accounted for in the models. First, the Consumer Price Index, which tracks changes in general urban consumer purchasing power, was used to deflate prices. Second, a trend variable that would capture any otherwise unexplained year-by-year price trends was included in exploratory analysis. However, neither variable was constructed to measure any distinctions between land use zones. The observed relative decline in the value of "Loose Restriction" properties may therefore still be due to the impacts of national economic forces, and not only (or at all) to the impact of the Land Use Plan.

What, then, are fair conclusions to make about the influence of the State's zoning interventions on land prices? The data analyzed here do indicate that the prices of land have fared differently depending on the land use class in which the land happened to be located. Those who are convinced that the zoning variables are not confounded by geographic effects unrelated to zoning regulations will take this as evidence that the Plan has influenced property values. Those who believe that other variables in the model have not adequately controlled for non-regulatory influences on price can reasonably respond that the zoning variables measure other impacts. In the next section the remainder of the variables considered in the model will be discussed, and should give a more complete basis for determining the adequacy of the models. Although a firm answer will remain elusive, a closer look at the other variables of Table 1 will be helpful. It will allow a comparison of the size of the ostensible price effects of zoning regulations with the size of the influence of many other factors.

#### 3.1.4 Other Variables in the Model

Two major decisions must be made in the formulation of any statistical regression model. First, a decision must be made about which variables to measure and include in the model. Second, the way in which the variables influence each other must be modelled. The second decision for this study led to the

logarithmic transformation of price and the inclusion of quadratic terms for certain variables, with the interpretive consequences discussed previously.<sup>14</sup> The choice of variables and their importance in the model is discussed below.

Any characteristic of property that can be hypothesized to have an influence on price is fair game for inclusion in a hedonic model of property values. If important characteristics are left out of the model, the results for included characteristics may be biased. If irrelevant characteristics are improperly included, the precision with which the proper characteristics can be analyzed declines. Because there are so many characteristics which might be supposed to have an influence on property prices, the possibility for both types of problem cannot be ignored.<sup>15</sup>

Choosing the proper characteristics begins with common sense. This study drew on the traditional categories of variables: the physical characteristics of the parcel, the characteristics of the homes on the parcel, and the locational attributes of the parcel. The policy variables defining the zoning class and Before/After-Plan period of purchase were also included. In addition, variables associated with the actual transaction were included. Other variables which influence property prices are the characteristics of buyers and sellers. However, for theoretical reasons their influence has been measured only indirectly. Hedonic theory maintains that the characteristics of buyers and sellers influence the supply and demand for each of the property attributes separately. The coefficients on the property attribute variables have supply and demand influences imbedded in them. A more sophisticated but more restrictive second stage of hedonic regression analysis could be used to account separately for the buyer and seller influences on the supply and demand for each characteristic in the first stage model.

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<sup>14</sup> On page 12. The decision about which transformations to use was based on theoretical expectations and some "goodness of fit" criteria, but was ultimately an ad hoc process. State of the art research usually applies the more systematic Box-Cox maximum likelihood search approach for hedonic models. However, this approach is quite costly, especially when more than a few continuous variables are involved. Even when Box-Cox is used, a number of ad hoc restrictions are put on the scope of the search to cut down on costs. The degree of improvement over a less rigorous approach is, therefore, not entirely clear.

<sup>15</sup> Some studies skirt around this problem by using discriminant analysis to formulate a smaller number of variables composed of aggregated clusters of related characteristics. The interpretation of these created variables can be difficult.

Although the general categories of characteristics are commonsensical, the choice of which specific characteristics to include and which to exclude is less clear cut. Sometimes prior expectations about prices are strong enough to ensure that a parcel characteristic is included, as with parcel size or with access to lake frontage. The presence of trees, the quality of the soil, the slope of the land, or the quality of wildlife habitat may not all be equally important to include. Where prior expectations were not firm enough, the decision about including a variable was based on the significance of the coefficients in exploratory ("stepwise") regression analysis. Thus, the characteristics listed in Table 1 and Appendix III are most, but not all, of those originally considered.

The physical attributes of the land shown in Table 1 that proved to be most important were those dealing with the size of the parcel in acres (ACRES, ACRESSQ); the one marking the existence of water frontage (LRFront); the variable indicating that the parcel had no road access (RDNONE); and the variable indicating that the parcel had included a telephone outlet on it when the parcel was purchased (PHONE). Judging from the size of the coefficients and of the Student t-statistics, the acreage and water frontage variables and the telephone variable have the strongest positive impacts on the marginal price of parcels not including single family residences. The value of parcels that did include a single family home were very greatly diminished if they were so inaccessible that no roads led up to them.

Of these most important variables, only PHONE requires further discussion. The variable is highly significant in both samples, and influences the value of a given parcel by 23.8% and 92.3% in the two different regressions. It seems unlikely that the simple presence or absence of phone service accounts for the importance of the characteristic. For the WITH SF HOUSES sample, it may be that parcels including homes with telephone outlets in them were of higher quality in other ways not modelled explicitly. PHONES would then act as a proxy for these other quality attributes. For the WITHOUT SF HOUSES sample, some of the strength of the variable may be associated with the fact that parcels with a "phone outlet" on them also had structures on them. Even though the BLDG variable should have accounted for the existence of buildings, PHONE might again be picking up differences in structure quality. A less plausible interpretation is that there was indeed a "telephone outlet" on the parcel when it was acquired, but that there was not an actual structure. This would be true if "telephone outlet" was interpreted to mean a telephone line was accessible on the parcel. In this case, the variable PHONE is probably a location specific proxy for development potential.

Other physical parcel characteristics were considered. The existence of a lake view for parcels that had no frontage

(LAKEVIEW) was important for parcels in the WITHOUT SF HOMES sample, and even more important on the subsample of completely undeveloped parcels. The type of waste disposal system available on the parcel was also of some importance for price. Parcels including single family homes were worth 31.4% less than other parcels, all else equal, if an outhouse was the only option available (OUTHOUS). Comparable parcels in the WITHOUT SF HOUSES sample were worth 41.3% more if they were in a location served by public sewers.<sup>16</sup> The type of drinking water supply had an additional price impact. The variable SPRINGH20 shows that parcels which only had spring water (as opposed to public water systems or wells, primarily) were of less value on average in both samples.

A steep slope on a parcel, which would be expected to increase the cost of developing the property, appears to detract from the value of WITHOUT SF HOUSES parcels, but only weakly so (see STEEP).<sup>17</sup> There were too few responses from single family homes that did not have electricity to measure price effects of its availability there, but the WITHOUT SF HOMES sample shows that a parcel serviced by an electric cable (CABLE) was worth 27.7% more than equivalent parcels without electric access. This result is only surprising in that it isn't stronger, especially in comparison to the coefficient on PHONE. Finally, of three variables describing the types of land included on the parcel, single family homes with wood or forest land included on them were slightly more valuable than such parcels without forests (WOODLAND); parcels excluding single family residences were worth more if the parcel included land "for offices or business use" (BSNESLND), and worth insignificantly less than otherwise if the parcel included cropland (CROPLAND).

The models include three kinds of specifically locational characteristics. First they measure the influence of the parcel's distance to the nearest highway, city, and village (DISHIWA, DISCITY, DISVIL AND VILSQ). Second, they account for the portion of the study area in which the parcel is found. The SOUTHERN region included parcels from Fulton, Warren, Washington, and Saratoga counties. The WESTERN region included parcels from Hamilton, Herkimer, Oneida, St. Lawrence, and Lewis counties. The base region (NORTHEAST) was suppressed in the regression, and

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<sup>16</sup> The PUBSEWR variable may also be a location dependent measure of development potential on undeveloped land, or it may be an indication that a building already existed on the parcel. A similar qualification could be put on the interpretation of SPRINGH20.

<sup>17</sup> The coefficient is also insignificant on the subsample of wholly undeveloped parcels. Both results contrast with the 1975 Cornell findings in Robert Craig, Thesis, 1975.

includes parcels from Clinton, Essex, and Franklin counties. Third, close proximity to state-owned Forest Preserve is included (NEARFP).

The positive coefficients on the NEARFP variable confirm the expectation<sup>18</sup> that parcels in the neighborhood of Forest Preserve are boosted in value. This is probably because owners benefit from the use of the forest and the guaranteed absence of unwanted neighbors on that land. The variable NEARFP is subjective in that it only notes the presence of nearby Forest Preserve known to the owners. Twenty-eight percent of owners aware of nearby Forest Preserve explicitly stated that its presence had influenced their decisions to buy the property.

The three locational regions devised for the study seem to imply little of note with regard to prices, though there is a weak indication from the negative coefficient on WESTERN that parcels in the western half of the study area are not as valuable, all else being equal. It is conceivable that a different regional grouping of the parcels would have yielded more significant results.

The only distance characteristic showing evidence of a price impact is the one measuring the distance of the parcel from the nearest major highway (DISHIWA). As expected, the more isolated a single family home or camp is from access to a highway, the less it is worth. The  $-.007$  coefficient is highly significant statistically, but indicates that each additional mile leads to an average of only a 0.7% decrease in price. Therefore, parcels would have to be quite some distance from a highway for the size of the decrease to reach the magnitude evidenced in some of the other coefficients. Although a negative coefficient is also found in the sample excluding single family homes, the impact there is much less strong. One possible explanation is that the owners need to travel to and from these parcels less often.

The lack of importance for the DISCITY variable may be an indication of the lack of need on the part of most landowners to commute to the nearby cities. More surprising are the insignificant coefficients on the variable measuring the distance of the parcel to the nearest village. Several other studies of the Adirondacks have shown this distance to have an important

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<sup>18</sup> A prior study of undeveloped Adirondack forest parcels found land prices to be positively influenced by proximity to Forest Preserve. See David H. Vrooman, Jr. 1976. Two Essays in Public Sector Economics; Land Values in the Adirondack Park and The Economics of the New York State Lottery. SUNY Albany, PhD Dissertation.



influence on land prices.<sup>19</sup> It seems logical, too, that land-owners would be concerned with the convenience of being near the services which a village can offer. Perhaps the variable's lack of significance in this study is because the model included an extensive list of variables with which distance is related. Sewerage and water systems variables, and the presence or absence of roads, are often directly related to proximity to a village.

The final locational variable, TAXRATE, is of a different sort. This fiscal variable measures the average equalized rate of property tax which applied to the town in which the parcel is found. The rate measured was applicable at or near the time of parcel purchase. The variable is locational only because the measurement is town specific. It may be interpreted as a neighborhood variable indicative of the general level of taxation in the town, with all that implies for tax burden and service provision. In this case, the negative coefficient indicates that parcels in highly taxed jurisdictions tend to be worth less, all else equal. The result would make sense if, for example, high tax rates had been imposed out of need to raise funds to improve poor services. Alternatively, a wealthy town with a large tax base could provide a high level of service even if the tax rate was itself low. An independent and more direct interpretation is that the average town tax rate certainly applies to the specific parcel under consideration. In fact, school tax districts that do not follow town boundary lines can cause substantial variation from the average town tax rate. This qualification aside, the negative coefficient implies that a given parcel that is taxed more highly is worth less. This indicates that the specific property tax burden has been capitalized into the value of the property.

The two transaction variables are not parcel characteristics like the other variables. But neither are they attributes associated with the supply or demand for parcels which should remain embedded in the coefficients for each characteristic. They were included in the regressions in order to purge the other coefficients of extraneous influence.<sup>20</sup> PORTION indicates that the parcel was part of a larger purchase. The large and highly significant coefficient on that variable for the WITHOUT SF HOMES sample indicates that such parcels were worth very much less than an equivalent parcel purchased on its own. This corresponds with the earlier observation that each additional acre contributes progressively less to price. The significant result on PORTION appeared only for the group of parcels excluding single family

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<sup>19</sup> Craig 1975, op. cit., Vrooman 1976, ibid.

<sup>20</sup> If important variables are left out of the model but are potentially correlated with variables in the model, the regression coefficients on the included variables may be biased.

residences. This implies that the portion of the larger purchase that is not sampled (often including a structure) tends to dominate the purchase price.

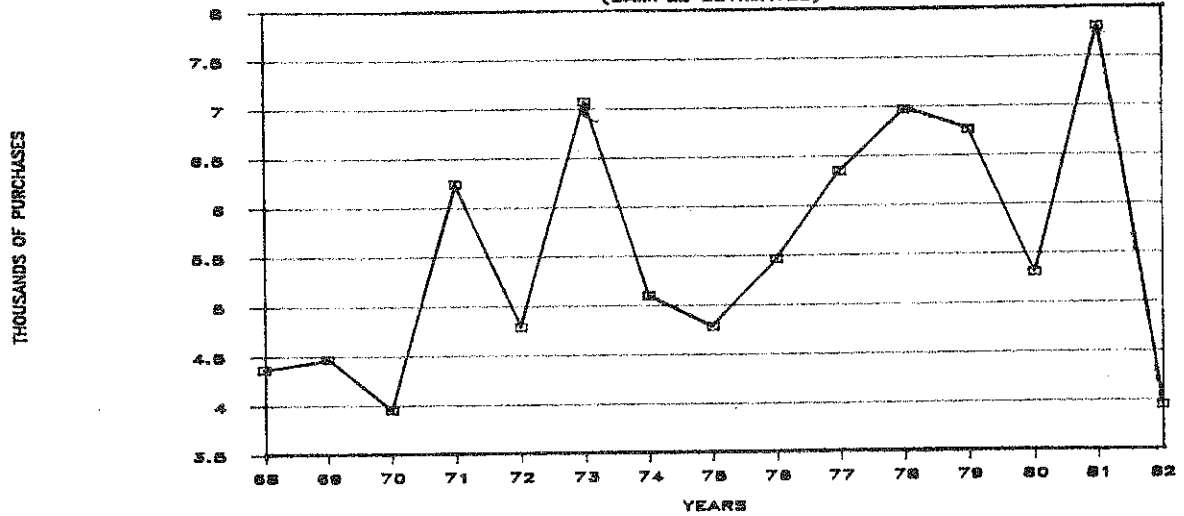
The YEAR variable is a yearly price trend variable that is not statistically important when included in the model. Two other aspects of time are already included in the model. First, all the purchase prices have been transformed (inflated) to their 1982 equivalents. Second the policy variables divide the period into pre- and post-Plan segments. The negative coefficient on YEAR may mean that there is a slight tendency for the real price of single family homes or camps to trend downwards over time, for reasons not readily explained in the context of this model.

The building characteristic variables show few surprises. In the WITHOUT SF HOUSES sample, parcels which include some kind of structure (see BLDG) are worth significantly more money. More detailed information is derived about the WITH SF HOUSES sample. There, the number of camps (CAMPS) or single family houses (HOUSES) is, of course, very important for price, though it should be noted that very few parcels had more than one such structure on them. The number of bathrooms (BATHROOMS) is a time-honored key indicator of value, where the negative coefficient on BATHSQ tells us that the fourth or fifth bathroom does not add as much to property values as the first or second bathroom. The square feet of floor space (SFFS) in the structure similarly is an important indicator of value that declines in its marginal importance as the structure gets larger. The relatively insignificant coefficients for the number of bedrooms (BEDROOMS) and the number of other rooms (OTHRROOMS) reveal that the overall size of the structure and the number of bathrooms are more precise indicators of the property's value than the mere number of separate rooms in the house.

The age of the building (BLDAGE) is probably best interpreted as an indicator of building quality. Older buildings have had more time to deteriorate. The coefficient of  $-.006$  says that for every year the structure has aged, its value has decreased by an average of 0.6%, all else equal. Note that although the coefficient is highly significant, a structure would have to be fairly old for its value to become very much lower than if it were new. Two other indicators of building quality follow. The more fireplaces with chimneys a structure has (FIREPL), the greater is its value, all else equal. This highly significant coefficient probably is as much an indicator of the general type of structure that has one or more fireplaces as it is of the number of fireplaces as such. Finally, the WOODHEAT variable contrasts with other structures those buildings that were heated primarily with wood. A wood heated structure tends to be worth substantially less than is a similar parcel with other types of heating systems. Apparently wood has continued to be a source of heat for the rugged and the less lavishly appointed homes.

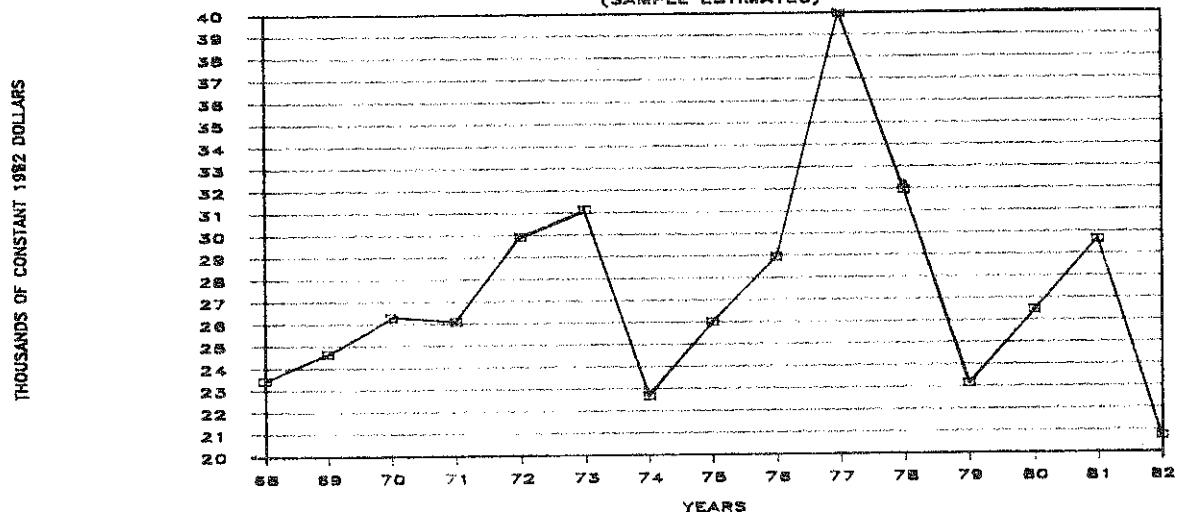
## PARCEL PURCHASES, 1968-1982

(SAMPLE ESTIMATES)



## AVERAGE PURCHASE PRICE, 1968-1982

(SAMPLE ESTIMATES)



## GROSS NATIONAL PRODUCT, 1968-1982

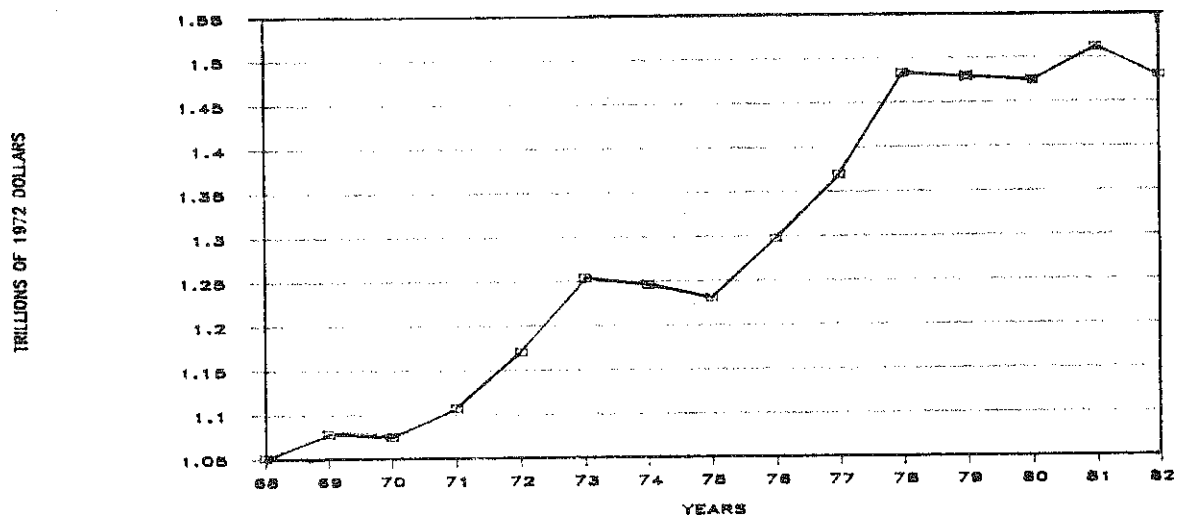


FIGURE 2

#### 4. OTHER RESULTS OF LAND MARKET SURVEY

##### 4.1.1 Parcel Transfers and Median Prices

For the region as a whole, the yearly ups and downs in open market parcel transfers and parcel prices are closely tied to ups and downs in the national economy (see Figure 2).<sup>21</sup> The number of transfers fell or was constant in every year of national recession, while price shifts were only slightly less well coordinated with the timing of shifts in GNP. Both (constant dollar) prices and transfers fell below 1968 levels in 1982.

There appear to have been shifts in the geographic concentration of land transfers between the six year period before adoption of the Land Use Plan and the 10 year post-Plan period. For parcels which had neither a single family home nor a vacation cottage on them at the time of parcel transfer, there has been a proportional<sup>22</sup> shift of transfers from inside the Park to the area just outside the Park (see Figure 3). The largest proportional drop between the two periods was for land in the Rural Use class. In comparison, the proportion of transfers of parcels including already existing homes increased after the Plan in the Hamlet class as well as in the area just outside the Park boundaries (Figure 4). Subject to the hesitations expressed previously, these findings could be consistent with the argument that zoning had channelled demand for housing and land away from the restrictive land use zones to parcels either outside the Park or in the least restrictive zones.

A simple comparison of (constant dollar) prices<sup>23</sup> by

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<sup>21</sup> The use of the term "transfers" is a loose interpretation of the data because multiple transfers of the same parcel are not included. An overestimate the number of transfers in a given year could just as well occur insofar as large purchases appear subdivided but not retransferred on current assessment roles.

<sup>22</sup> I.e. a measurement of the proportion (for each land use class) of all the parcels purchased before, as contrasted with the proportion purchased after, the Plan was implemented.

<sup>23</sup> In other words, prices not controlling in a regression framework for the variable characteristics of parcels. The difference controlling for characteristics like acreage can make is great. For example, the median per acre price of primarily undeveloped land in the "Tight Control" combined parcel group actually rose from \$653 to \$808 (\$296 to \$632 per acre for parcels at least one acre in size) while the total price was falling from \$13274 to \$8065 (Appendix V). Obviously, the size of parcels was smaller in the post-Plan period (13 acres median fell to 7 acres). The apparent trend to smaller parcels on more

Figure 3. The Proportion of Open Market Parcel Purchases by Land Use Class, for Parcels Without Single Family Homes or Camps

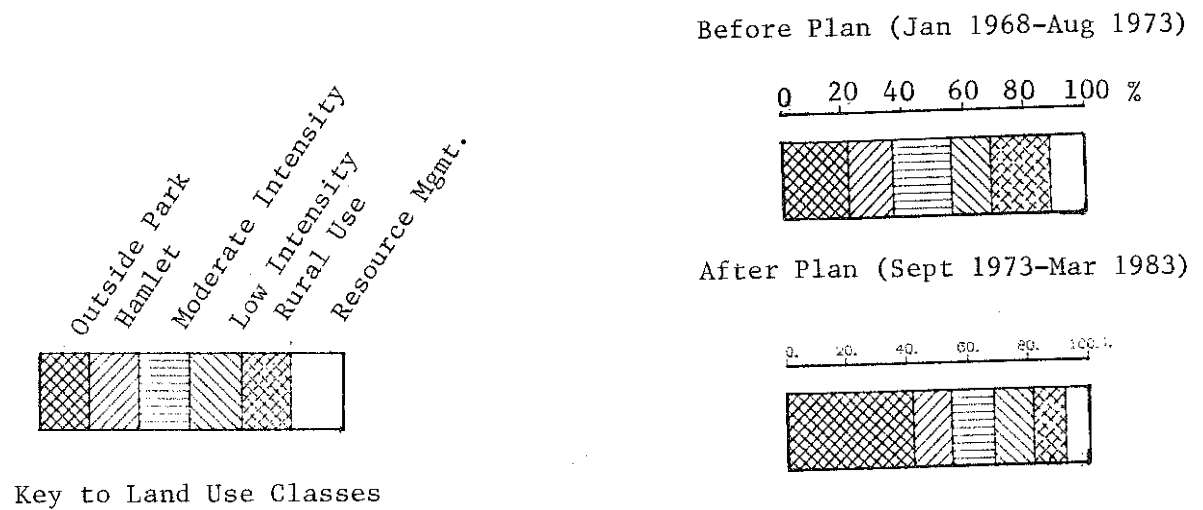


Figure 4. The Proportion of Open Market Parcel Purchases by Land Use Class, for Parcels With a Single Family Home or Camp

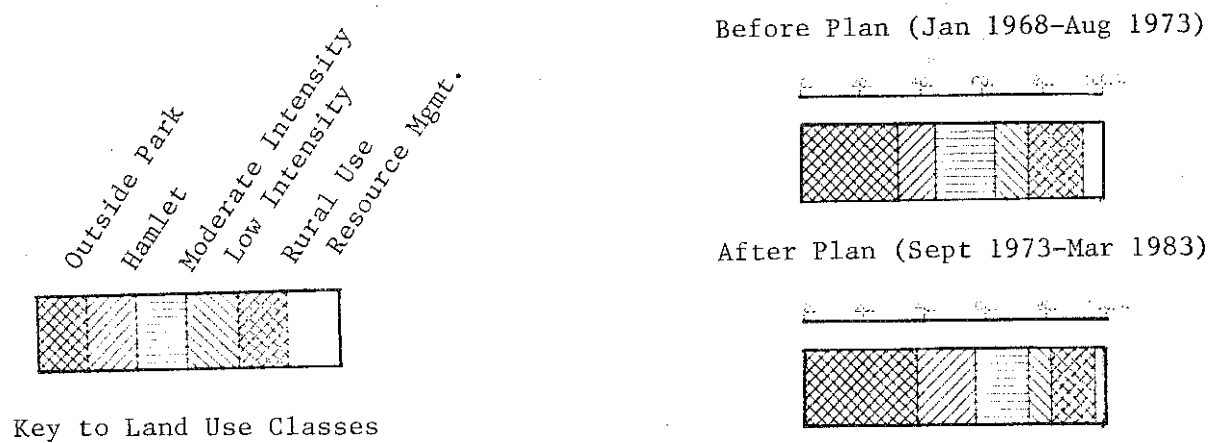


TABLE 3

Prices\* of sample parcels bought on open market, by land use class, for periods before and after Land Use Plan

Land Class	Before Plan (1/68-8/73)	After Plan (9/73-5/83)
Hamlet		
included house	\$40,698 (\$48,688)	\$28,051 (\$36,904)
no house	\$28,571 (\$34,486)	\$13,158 (\$22,179)
Moderate Intensity		
included house	\$37,611 (\$50,701)	\$34,805 (\$45,004)
no house	\$9,735 (\$17,198)	\$6,090 (\$14,223)
Low Intensity		
included house	\$33,265 (\$48,822)	\$33,569 (\$38,453)
no house	\$7,041 (\$12,751)	\$6,993 (\$23,521)
Rural Use		
included house	\$20,661 (\$38,700)	\$31,802 (\$37,168)
no house	\$11,062 (\$15,896)	\$6,452 (\$11,355)
Resource Management		
included house	\$18,895 (\$28,817)	\$35,068 (\$40,061)
no house	\$13,774 (\$14,962)	\$15,327 (\$29,922)
Outside of Park		
included house	\$32,849 (\$36,893)	\$37,731 (\$41,226)
no house	\$6,637 (\$14,014)	\$5,600 (\$13,054)

\* The prices are in constant 1982 dollars. Median prices are first, average prices in parentheses. Reference to Appendix VI shows where the calculations are based on a small number of parcels.

zones shows evidence of change in relative price levels since the introduction of the Land Use Plan (Table 3). For both developed and undeveloped parcels, the median price of parcels in Hamlets and Moderate Intensity areas was lower in the group of parcels acquired after the Plan than in the before-Plan group, while the price in Low Intensity areas remained relatively constant. Median prices outside the Park rose for the sample including single family homes, as did prices in the Resource Management areas. However, while median prices of Rural Use land rose for parcels including single family homes, it fell for parcels without such homes. The increases in the prices of Resource Management properties, and even more so the substantial decrease in the value of Hamlet properties, are particularly noteworthy. These results are largely echoed in the regression coefficients on the land use policy variables. They give some indication of which of the specific land use classes dominated results within the "Tight Control" and "Loose Control" groups.

#### 4.1.2 Other Characteristics of Parcel Transfers

Surprisingly few parcels with homes or camps on them were purchased with the involvement of a bank mortgage, especially inside the Park (see MORTGAGE, Table 1, Appendix V). Between the pre- and post-Plan periods there was a distinct shift away from "cash" purchases of property. But "cash" transactions were more popular inside the Park than out, and have remained so. Mortgages financed through the owner have become increasingly common since 1973. This trend developed nationally as interest rates skyrocketed. For Adirondack parcels, the median interest rate on mortgages during the whole period was 8%, and the median payback period was ten years.

For parcels which did not have a camp or house on them when purchased (see Table 2, Appendix V), cash transactions were even more popular (50-70% of all sales, depending on land use area) than in the single family home group. This is undoubtedly because lower dollar amounts are required for undeveloped land. For this group, the proportion of purchases conducted in cash has held relatively constant between the two time periods. Cash sales were most common in the "Tight Control" areas.

Real estate broker involvement in sales (NOBROKER, Appendix V) has been increasing over time even as bank mortgages have declined in importance, with an exception for the "Loose Control" areas in Table 2 of Appendix V. The highest level of realtor involvement was with the post-1973 purchases of Rural Use and Resource Management parcels including a home (65%), and the lowest was with pre-1973 purchases of undeveloped land outside the Park (24%).

Not everyone who bought Adirondack property shopped around first. But in spite of the fact that only about 40% of all

parcels were owned by people who had looked at more than two parcels before buying, only a few said that they had made unpleasant discoveries about their land after purchase.

Approximately two-thirds of the parcels sampled were acquired by purchase from a stranger, or on the "open market". On a year-by-year basis, the proportion of transfers purchased on the open market has remained fairly stable.<sup>24</sup> This implies that there have been few major changes in the balance of forces that determine whether or not a parcel is sold, inherited, traded, and so on.

#### 4.2 Parcel and Owner Characteristics: Inside Park, Outside Park

Just over one-third of the returned questionnaires (including those not about open market transactions) concerned parcels outside of the Park boundaries. These parcels can provide a rough standard of comparison for the parcels inside the Park, and serve as a kind of "control" group. There were numerous important differences in the characteristics of parcels and owners depending on whether or not the parcels were inside or outside of the Park.

In general, the parcels acquired inside the Park more commonly represented the characteristics of seasonal or recreational home ownerships than did parcels in surrounding localities (Table 4). Thus, parcels acquired inside the Park were significantly more likely to have lake frontage, to be forested, and to have been acquired for recreational purposes. They were less likely to have road access, or to include cropland, openland, or brushland. In comparison to parcels outside the Park, parcels on the inside were somewhat more likely to be owned by persons describing themselves as very recently arrived permanent residents, seasonal residents, or nonresidents of the study region.

Although parcels lying outside the Park were more likely than inside parcels to have had a single family house on them when acquired, they were equally likely to have had a structure added to them. This is indicative of higher building densities outside the Park. A higher proportion of parcels inside the Park were owned by partnerships, a lower proportion were owned jointly by a husband and wife, and approximately equal proportions were owned by businesses.

Finally, parcels inside the Park were more likely to have been acquired by persons who a) inherited the land, b) paid less

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<sup>24</sup> A chi-square test of the hypothesis that the ratio of purchases to inheritances was constant between 1968-1983 could not be rejected with acceptable confidence.



TABLE 4

Comparison of Parcels Inside and Outside Park Boundaries  
(including non-open market transfers)

<u>Parcel Characteristic</u>	<u>Proportion of Parcels Having Characteristic</u>	
	<u>Inside</u>	<u>Outside</u>
Water frontage	34%	14%
Wood or forest land	56%	37%
Acquired for recreation	31%	25%
No road access from parcel	7%	4%
Cropland	5%	8%
Openland or pasture	16%	20%
Brushland	18%	25%
Owner lived in area < 5 years (if permanent resident)	14%	11%
Owner is seasonal or non- resident of area	44%	15%
Single family house*	40%	67%
Structure added later	27%	26%
Partnership owns	10%	7%
Husband/wife own	51%	57%
Business or corporation owns	4%	4%
Inherited	17%	9%
Price > \$30000 (1982 \$)	32%	40%
Owner over 40 years old	77%	62%
Owner income in 1981 > \$25000	55%	40%
Owner** approves Land Use Plan	29%	21%
Owner** says Plan impacts reg- ional employment positively	4%	2%
Owner** says Plan impacts reg- ional environment positively	38%	32%

\* Proportions are of structures with some kind of building on them.

\*\* Proportions are for owners familiar with Plan only.

if they bought it, but c) were older and had higher incomes, and d) approved of the Land Use Plan and thought it had had positive effects on the economy and environment. Point (a) suggests that nonmarket forces may have a relatively strong role in determining land turnovers inside the Park. This is of interest in conjunction with the finding that seasonal residents, who were more likely to own inside-the-Park parcels, have on average owned their parcels as long or longer than permanent residents of the region. Both the importance of inheritance and the continuity of seasonal ownership are signs of comparatively stable ownership patterns inside the Park. Point (d) may indicate that the Plan has discouraged (encouraged) parcel acquisition inside the Park amongst those disapproving (approving) of regional land use policies; i.e. those who like what the Plan does are more likely to acquire land where it is in effect. Of course, it is also possible that the typical owner who has always purchased the type of recreational land found inside the Park was more favorably disposed towards zoning to begin with.

#### 4.3 Parcel Size

Adirondack parcels acquired after 1967 tended to be small. More than half were less than or equal to one acre (see Figure 5a). However, a quarter of them were adjacent to a second parcel in the same ownership (Figure 5b). Thus the average parcel size of almost 14 acres (pulled up from the smaller median because of a few very large parcels) probably underestimates parcel size from the owner's perspective. The parcels acquired during this period account for 66% of all privately owned parcels in the region. But they account for only an estimated 55% of the total privately owned land area in the region. This suggests that in the Adirondacks as elsewhere, the more recently acquired parcels tend to be smaller than the older parcels (those acquired before 1968 in this case). This finding may be a manifestation of the national trend to subdivision of rural land, or it may also document the general propensity of larger parcels to transfer ownerships less often.

The largest average parcels were found in the Resource Management (48 acres), Rural Use (20 acres), and Industrial (87 acres - but only two parcels) land use classes, while the smallest parcels were in the Hamlet and Moderate Intensity (3 acres each), and Low Intensity (9 acres) land use classes. All of these average sizes are larger than the minimum density guidelines for a single structure in each zone, although once again the averages are skewed to the high side by large parcels. Parcels outside the Park averaged slightly larger (at 15 acres) than the overall mean parcel size, and accounted for two-fifths of the area under study. Parcels tended to be smaller than average if they included a residence, were lakefront properties, were in a hamlet or village, or were owned by someone who owned no other land. Cropland or forestland, and land owned by

Figure 5a.

## PARCEL SIZE DISTRIBUTION

(Sample Includes Inheritances, etc.)

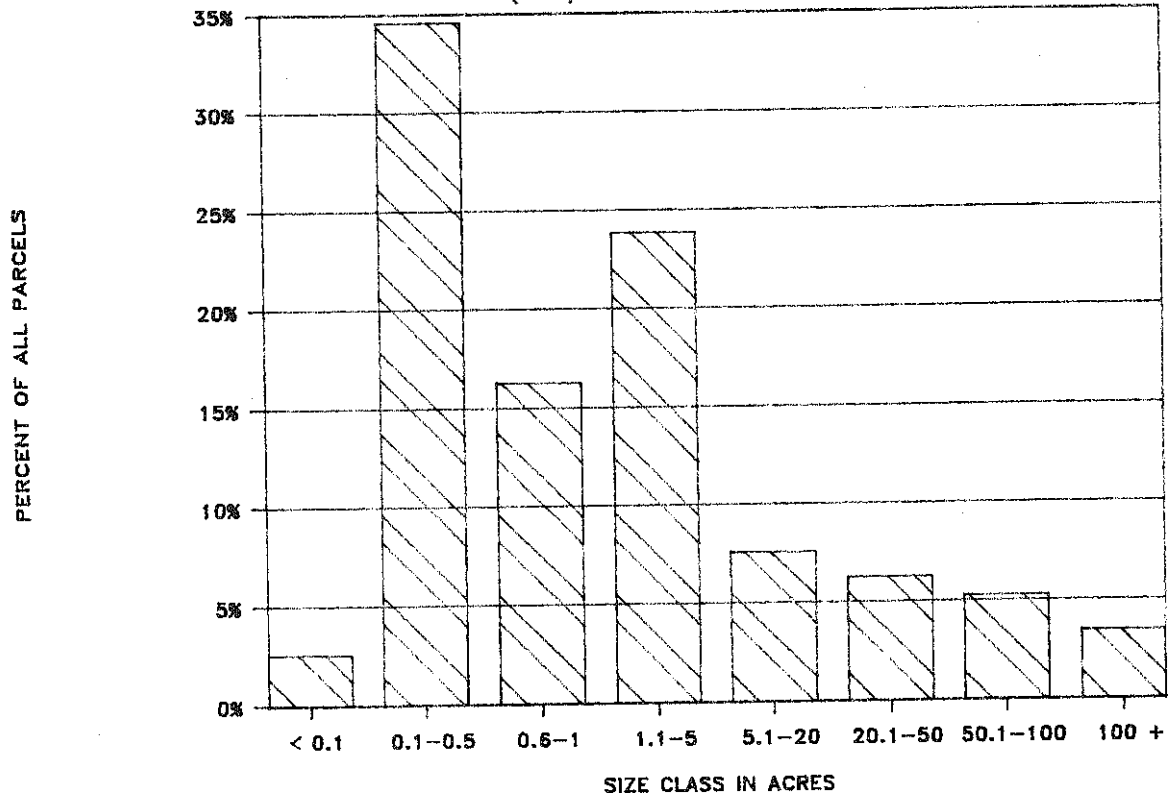
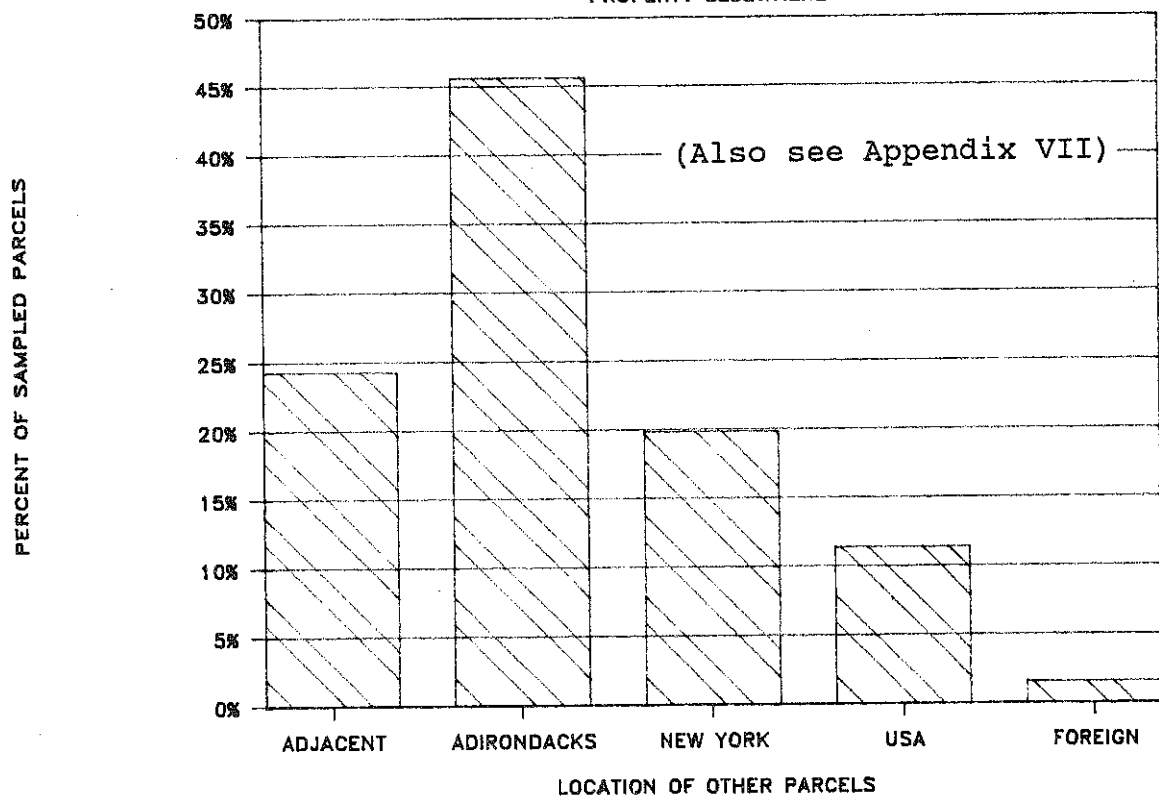


Figure 5b.

## PROPORTION OF PARCELS WHOSE OWNER HAS

PROPERTY ELSEWHERE



businesses or non-residents of the region, tended to be larger than average, as did parcels owned by someone who approved of the Land Use Plan. This latter point is of interest. Apparently, current owners of many of the very large parcels do not find the Plan to be onerous, perhaps because the land is large enough that the density regulations need not interfere with the owner's intentions for the property. Viewed otherwise, the large parcels tend to be in the hands of persons not likely to want to subdivide and develop them.

#### 4.4 Parcel Location

Over half the parcels in the sample were within 0.7 miles of the nearest accessible lake or river, and within 3 miles of the nearest village. These distances indicate the tendency of parcels to cluster around such features. Other median distances (as estimated by the respondents) appear in Table 5.

#### 4.5 Intended Parcel Uses

The parcels were overwhelmingly acquired for residential purposes (Table 6).<sup>25</sup> More were intended for use as permanent residences than as seasonal residences (40% versus 26% of all parcels sampled). Private recreational uses were more likely to have been in the minds of owners acquiring properties for seasonal residences than for permanent residences. Speculative motives influenced 12% of the parcel acquisitions but were usually subordinated to other reasons for acquiring the parcel. Only for owners of 5-6% of the parcels was speculation a primary motivation for acquisition, and such owners were more likely to be businesses.

#### 4.6 Characteristics of Structures

Half of the returned questionnaires were about parcels which had had a structure on them when acquired. The vast majority of these either had a "single family house" or a "vacation cottage or camp" on them. These residences averaged approximately 1 bathroom, 3 bedrooms, and 3 other rooms. Fully 72% of the parcels with structures on them in 1982 were served by a septic tank sewerage system, a number which is very close to the 70.4% 1980 census estimate of Adirondack households discharging waste to a septic tank. Most houses were heated primarily by oil (43%) or wood (34%) when acquired. Twenty-nine percent of the homes have a different primary fuel source today, presumably as owners of oil or electric heating systems switched to less expensive fuel sources.

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<sup>25</sup> Though non-respondent bias would alter the figures slightly.

TABLE 5

Owner estimated distances from parcel to services or other points of interest (includes inherited parcels, gifts, etc.)

<u>Feature</u>	<u>Median</u>	<u>Mean</u>	<u>Feature on parcel</u>
...miles to the nearest...	(miles)		or adjacent (%)
.... grocery store	2.0	3.7	2.9%
.... major highway	10.0	20.0	5.0%
.... grade school	3.0	4.7	1.4%
.... fire station	2.0	3.2	2.2%
.... general hospital	13.0	17.2	0.1%
.... health clinic	7.5	9.4	2.0%
.... village	3.0	4.2	10.9%
.... city	25.0	28.8	0.7%
.... accessible lake or river	0.7	2.4	29.0%
.... neighbor's house	0.0	0.2	65.6%
.... outdoor recreation area (eg. campground, ski area)	4.0	6.0	7.4%

TABLE 6

What did you intend as the primary land use at the time you acquired the parcel? (includes inherited parcels, gifts, etc.)

	Most important or only use	An impor- tant use
	----Percent of parcels----	
<u>Intended Land Uses</u>		
Operate as farm .....	2.5	4.8
Seasonal home .....	18.5	25.8
Permanent home .....	32.7	39.6
Speculative investment .....	6.1	12.3
Subdivide and sell lots .....	0.8	2.3
Develop commercially .....	2.0	3.2
Harvest timber .....	2.3	6.5
Private recreational uses .....	13.2	26.2
Add to existing property .....	4.2	4.8
Other .....	0.8	3.4

NOTE: Respondents ranked more than one important use, so percentages do not add to 100%.

There is some evidence that buildings are being added to Moderate and Low Intensity land use areas in disproportionately large quantities (as a percent of the number of parcels acquired in those areas). This may be because these land use areas tend to include the sites around lake shores which have been most popular for residential use, and because density regulations are only moderately restrictive there. Almost all building additions were on parcels owned by permanent residents. Seasonal residents rarely purchased property to be developed later, as shown by the fact that only a negligible proportion of parcels acquired by seasonal residents did not have a home already on them.

#### 4.7 Land Use Classes

Of the returns about parcels within the Park's boundaries, most concerned parcels in the Moderate Intensity (25%), Rural Use (23%), and Hamlet (22%) land classes, with smaller numbers from Low Intensity (19%) and Resource Management (11%) areas. According to APA statistics, land in the Resource Management land use class represents 52.4% of the private land area of the Park, but only 41.2% of the land area covered in the questionnaire returns was in this land class (Figure 6). By contrast, the study surveyed uncharacteristically high proportions of acreage in most of the other classes. Only Rural Use land seemed to appear in this study in about the same proportion (32%) as it exists in the Park. The most probable reason for this result is the greater tendency of large Resource Management parcels to be owned by corporations and partnerships of long standing, meaning they would be excluded from consideration by the 1968 cut-off date used in this study.

#### 4.8 Owner Familiarity With the Land Use Plan

Fifty-eight percent of the parcels were owned by persons claiming familiarity with the regional Land Use Plan at the time of the survey. However, some of them certainly learned about the Plan after they had already acquired their property. Owners of parcels inside the Park were, as expected, more likely to be familiar than were owners of parcels outside the Park (64% to 45%). However, about half of the parcels acquired since 1968 are owned by persons who did not know the land use class of their parcel. If the parcels outside the Park are excluded from consideration, the number improves to about three-fifths of the in-Park owners who at least made a guess as to which class the parcel was in. But a substantial number of owners listed a land use class which does not agree with the one which was looked up by the researchers on APA maps. Although in some cases the discrepancy may indicate a failure by the researchers to adequately identify the proper parcel for the owner, it seems certain that many owners are simply not aware of the details of the zoning geography, even as it applies to them. The lack of

Figure 6a.

## ACREAGE DISTRIBUTION BY LAND USE CLASS,

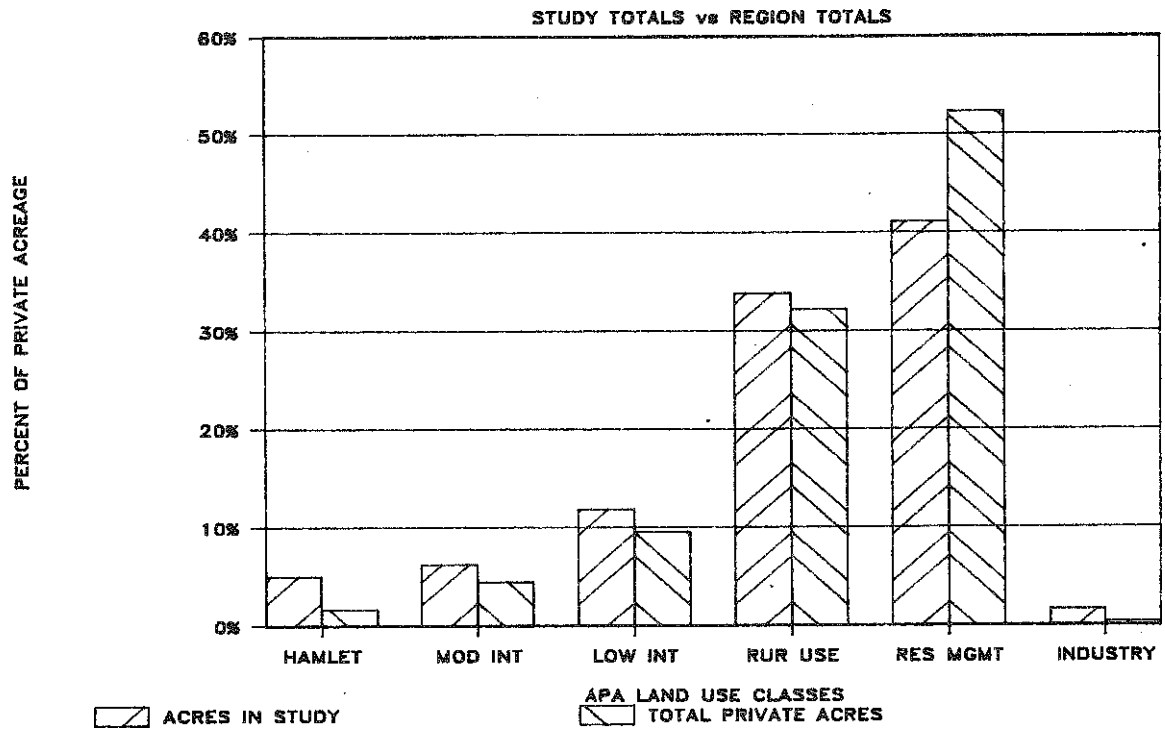
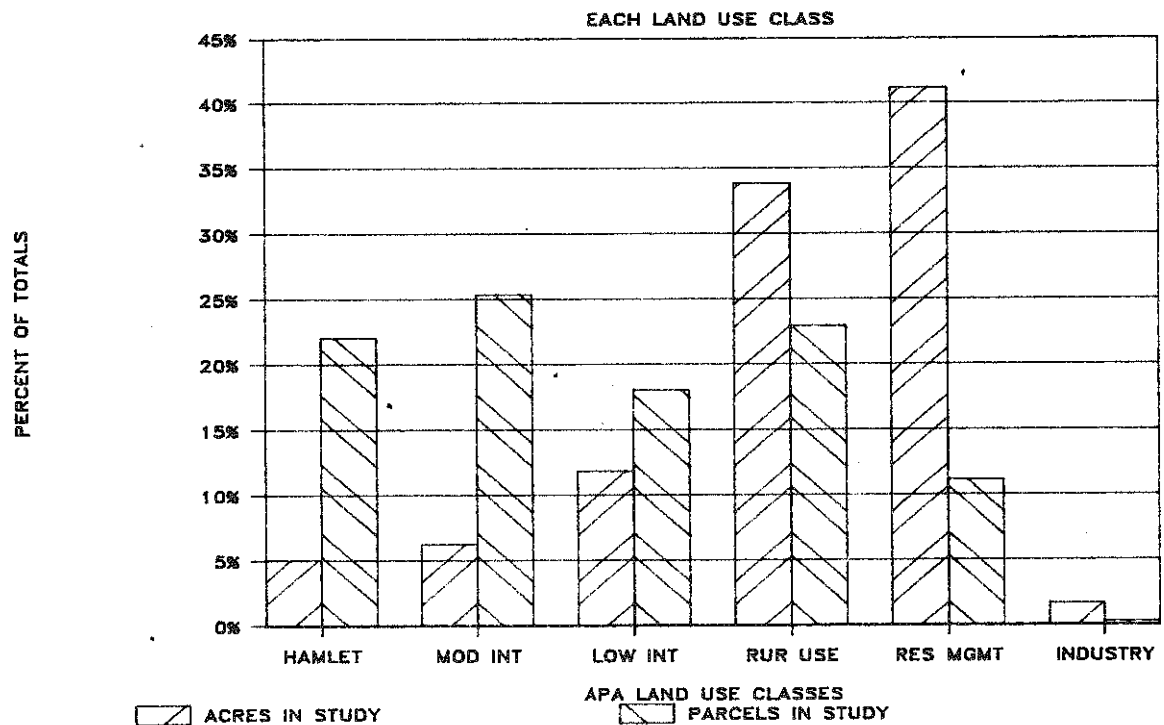


Figure 6b.

## PROPORTION OF ACRES AND OF PARCELS IN



awareness on the part of owners of land inside the Park, if accurately reflected, makes it less probable that landowner preferences for specific Adirondack properties can have been strongly affected by the Land Use Plan.

## 5. Conclusions

The State of New York has taken an active and often controversial role in directing the course of land use in the Adirondacks. This study has explored the consequences of this role for private land prices in the region, and has also presented some background information about landownership and parcel characteristics.

The depiction of background characteristics covered the many distinctions between parcels inside and outside the Park boundaries; the predominance of small residential and lakefront properties in the sample; the proximity of parcels to water and to villages; the characteristics of the buildings (noting a substantial shift over time in primary heating fuels) that occupied about half of the parcels when purchased; the distribution of parcels by land use classes; and the fact that many of the owners of property in the region remain unaware of important aspects of zoning in the region.

Some effects of the state's alterations to the Adirondack landowner profile were discussed. Parcels near state owned land gained added value because of their location. Land prices have been both positively and negatively influenced by their location in different land use zones. However, isolating the influence of zoning from that of other factors over which the state has little control is difficult. Moreover, the magnitudes of the zone effects are only moderately large in relation to some of the other influences on land and real property prices.

Some people believe that the zoning regulations effected an unconstitutional "taking" of the value of their property. It is indisputable that the promulgation of the Adirondack Land Use and Development Plan shifted the existing balance of property rights away from individual property owners and from local governments. And there may have been cases where individual parcels of land were deprived of value due to state actions, though this study did not address that question. However, without prejudging the legal merits of a "taking" claim, the results presented here do not support the contention that APA zoning has seriously impaired property values throughout the region.



## APPENDIX I

Because the zones (and the creation of the Park as a whole) were consciously tailored to fit pre-existing geographical circumstances, all the zones did not start out as equivalent areas. It is therefore harder to attribute the causes of new differences between zones solely to regulation. Other factors might have had differential impacts in different areas even if zoning did not exist. In order to move beyond the easy mechanical conclusions about statistical correlation to important interpretations about the force of causation, we must be confident that our model has adequately controlled for other location specific differences between parcels. An attempt was made to provide adequate location controls in the model.

The analysis is also hard to interpret because economic theory on this topic is of limited help. It does not provide strong expectations about the directions of price change that can then be checked against the real world. For example, common wisdom and simple economic theory lead to the expectation that undeveloped land in the most restrictively regulated areas should fall in value because its development potential has been curtailed. This is the logic facing an individual owner who sees fewer options for the use of his or her individual parcel. In the aggregate, this perception of "fewer options" could indeed translate into reduced overall demand, and therefore prices, for undeveloped land. This presumes, of course, that development of this land was a commonly desired option to begin with.

But logical examples of effects working in the opposite direction for undeveloped land also exist. If potential buyers have refrained from offering high prices because of concern about uncontrolled development on neighboring parcels, stricter zoning could lead to higher overall demands and prices. Indeed, any history of zoning is replete with examples where zoning was introduced precisely with the intention of protecting property values from unwanted neighborhood effects. Take another example. Minimum density regulations are intended to reduce the number of houses in a given area. As a consequence, the economic "supply" of houses in the area is also likely to be curtailed. The induced scarcity would generally lead to higher prices for existing housing, but it could also lead to an unexpected increase in the price of undeveloped land. This might occur if the demand for housing were very "inelastic" (i.e. if the increased cost of housing did not greatly reduce the number of homes desired). Because density regulations require more land per house on average, more land might be demanded even to produce a smaller number of houses. In sum, the fact that many contradictory outcomes can be shown to be theoretically consistent with effects of the Plan is disconcerting. A theory which predicts too many possible outcomes is difficult to reject, and is evaluated almost exclusively based on personal predispositions

about its plausibility. Together with the normal difficulties that hinder the construction of statistical representations of the "real world", this theoretical indeterminacy weakens our confidence in attributing observed changes to the influence of regulation.

## APPENDIX II

Glossary of Variable Names Used in Report Tables

ACRES: The size of the parcel in acres  
 BATHROOMS: The number of bathrooms in the largest house or camp on parcel at purchase  
 BEDROOMS: The number of bedrooms in the largest house or camp on parcel at purchase  
 BLDAGE: The age of the largest house or camp when purchased  
 BLDG: The number of non-single family house structures on the parcel when purchased  
 BSNESLND: Yes if parcel included land for business uses  
 CABLE: Yes if electric cable reached property at purchase  
 CAMPS: The number of "camps" or vacation cottages in purchase  
 CROPLAND: Yes if parcel included land in crops within 5 years prior to purchase  
 DISCITY: Distance of parcel to nearest city  
  
 DISHIWA: Distance of parcel to nearest highway  
 DISVIL: Distance of parcel to nearest village  
 FIFTY+: Owner was fifty or older at time of purchase  
 FIREPL: The number of fireplaces in the largest house or camp on parcel at purchase  
 HOUSES: The number of single family houses in purchase  
 HTELEC: The largest house or camp was heated primarily with electricity when acquired  
 HTOTHER: Oil, gas, coal, or other main heat source in largest house when acquired  
 INCHI: Owner's family income more than \$30,000 in 1981  
 INCMED: Owner's family income between \$15,000 and \$30,000 in 1981  
 INCLOW: Owner's family income below \$15,000 in 1981  
 INCOTH: Owner not an individual (i.e. a business, institution)  
  
 LAKEVIEW: Yes if parcel did not include frontage, but had a lake view  
 LRFRONT: Yes if parcel included lake or river frontage  
 NEARFP: Yes if parcel was within ten minute walk of Forest Preserve  
 NEWLOOSE: Yes if parcel purchased after 7/73 in the Moderate Intensity, Low Intensity or Hamlet land use classes  
 NEWOUT: Yes if parcel purchased after 7/73 outside the Park  
  
 NEWTIGHT: Yes if parcel purchased after 7/73 in the Rural Use or Resource Management land use classes  
 NORTHEST: Yes if parcel was in Clinton, Franklin, or Essex counties  
 NOBROKER: Yes if parcel was not purchased through a realtor  
 NOCOLGRD: Owner did not graduate from fourth year of college  
 NOHSGRAD: Owner did not graduate from twelfth grade

OLDLOOSE: Yes if parcel purchased before 8/73 in what became Moderate Intensity, Low Intensity or Hamlet land use class areas

OLDOUT: Yes if parcel purchased before 8/73 outside the Park

OLDTIGHT: Yes if parcel purchased before 8/73 in what became Rural Use or Resource Management land use class areas

OTHAGE: Owner was younger than 30 at purchase - or a business

OTHERLND: Yes if parcel included land in other uses besides business land or cropland

OTHGRAD: Owner graduated from college - or was a business

OTHMTGE: Yes if other kinds of financing involved

OTHROOMS: The number of non bed- or bathrooms in largest house or camp at purchase

OTHSEWR: Yes if parcel not served by public sewer or outhouse

OUTHOU: Yes if parcel included an outhouse

PAYCASH: Yes if the buyer paid "cash" for the parcel

PELSEWHR: Yes if owner owns any non-adjacent land anywhere

PERMRES: Yes if owner described self as "permanent" Adirondack resident

PHONE: Yes if parcel had phone "outlet" on parcel at purchase

PNONE: Yes if owner owns no other property

PORTION: Yes if parcel was part of larger purchase

POTHER: Yes if owner owns other parcels outside of region

PPERACR: Per acre price if parcel is greater than one acre

PPERACRE: Per acre price (PRICE/ACRE)

PRICE: Purchase price inflated to 1982 dollars

PTOUCH: Yes if owner owns adjacent parcel

PUBSEWR: Yes if parcel served by public sewer system

RDNONE: Yes if no roads led up to parcel

SFFS: The square footage of the largest house or camp on parcel at purchase

SOUTHERN: Yes if parcel was in Fulton, Washington, Warren, or Saratoga counties

SPRINGH20: Yes if parcel's drinking water came from spring

STEEP: Yes if parcel was described as mostly "steep"

TAXRATE: Average equalized tax rate (per \$1000 assessment) in township

THRUOWNR: Yes if the mortgage was financed through the seller

WESTERN: Yes if parcel was in Hamilton, Herkimer, Oneida, St. Lawrence, or Lewis counties

WOODHEAT: Yes if the largest house or camp was heated primarily with wood when acquired

WOODLAND: Yes if the parcel contained woodland when acquired

YEAR: Trend from 1 to 16 for 1968 to 1983

30-49: Owner was 30 to 49 years old at time of purchase

## APPENDIX III

This appendix presents the descriptive statistics for those variables that were included in the regression models. It also gives some indication of the magnitude of the missing data problem that is common for mail surveys. Data was missing for some parcels for some variables if the questionnaire respondent did not answer all questions on the questionnaire, and if there was no secondary information source from which to obtain the needed data. The "Before Estimation" column in the tables below gives the number of parcels (out of 338 or 471 in each sample respectively) for which information was not missing. Values for only two of the variables listed (BLDAGE and SFFS) were missing for more than about five percent of the total parcels. The "After Estimation" column lists descriptive statistics for the parcels included in the samples after the "holes" in the data set were filled in.

Parcels were dropped from the samples if "too many", or 3 to 5 variables (inclusive of some not listed here), were missing for the parcel. Also, all cases with no estimate of sales price were dropped. Thus the "Before Estimation" columns are based on the maximum number of actual responses given for each variable, while the "After Estimation" columns were based only on parcels for which information on a sufficient number of variables was available - with the added condition that the data for a small number of missing variables has been artificially generated.

The only truly satisfactory way to fill in missing data gaps is to somehow discover the true missing values. This task can be prohibitively expensive or impossible however, so several less satisfactory options remain. One option is to discard parcels with incomplete information. Because many parcels were missing information on only one variable, this option would have led to the dismissal of much valid data, might have left a biased residual sample, and would have left smaller sample sizes.<sup>26</sup> A second option, to omit certain variables from the models, was also deemed unsatisfactory because the variables were believed to be important influences on land values.

The option adopted here for continuous variables was to statistically predict the missing values using other variables on the questionnaire (including some not in the regressions and some of the independent variables in the regressions) as predictors. The BMDP program BMDPAM permits such calculations. Minor missing variable problems for categorical variables arose with

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<sup>26</sup> A detailed discussion of missing data problems is found in Jacob and Patricia Cohen, Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, Chapter 7. John Wiley, 1975.

LRFRONT and LAKEVIEW. Logistic regression was used to predict the value of these variables when they were missing. However, since the proportion of parcels with lake access was 30% or less, a simple assumption of no frontage usually would be correct.

A separate analysis evaluates the differences between persons who did and did not respond to the questionnaire. It is available upon request.

Means, Standard Deviations, Medians of Continuous Regression Variables: Before, After  
Missing Data Estimation

		After Estimation (326 Parcels)			Before Estimation (338 Parcels Tot.)	
VARIABLE	DESCRIPTION	MEAN	STD.DEV.	MEDIAN	NUMBER OF PARCELS	MEAN
Parcels with homes						
PRICE	Price (1982\$)	41369	33645	34092	338	40651
ACRES	Acreage	9.5	31.4	0.7	338	10.0
ACRESSQ	Acres Squared	1073.1	6140.9	0.5	338	1154
BATHROOMS	Bathrooms	1.1	0.7	1.0	325	1.2
BATHSQ	Bathrooms Squared	1.8	2.4	1.0	325	1.8
BEDROOMS	Bedrooms	2.8	1.5	3	323	2.8
BLDAGE	House Age (years)	39.4	36.5	28.6	285	40.2
CAMPS	No. of Camps, Cottages	0.4	0.6	0	338	0.3
DISCITY	City Distance (miles)	27.4	22.2	23.0	333	27.4
DISHIWA	Highway Distance (miles)	21.3	22.2	12.3	320	20.7
DISVIL	Village Distance (miles)	4.1	4.6	3.0	328	4.1
FIREPL	No. of Fireplaces	0.4	0.6	0	338	0.4
HOUSES	No. of 1-Family Homes	0.7	0.5	1	338	0.7
OTHRROOMS	Other rooms	2.9	1.5	3	321	2.8
SFFS	Floor Space (sq.ft.)	1502	1751	1200	282	1495
SFFSSQ	Floor Space Squared	5315126	30791709	1440000	282	5632343
TAXRATE	Town Tax Rate(%)	2.5	4.8	2.5	329	2.5
VILSQ	Village Distance Squared	37.8	100.4	9.0	328	37.0
YEAR	Trend (1968=1, 1983=16)	8.8	4.3	9.0	338	8.8
Parcels without homes		(455 Parcels)			(471 Total Parcels)	
PRICE	Price (1982\$)	18995	30343	8064	460	18690
ACRES	Acreage	14.6	35.0	1.1	465	14.9
ACRESSQ	Acres squared	1433	-	1.21	465	1442
DISHIWA	Highway Distance (miles)	17.7	19.8	10	452	17.9
DISVIL	Village Distance (miles)	4.0	3.8	3	444	4.0
TAXRATE	Town Tax Rate (%)	2.5	5.2	2.5	456	2.5
VILSQ	Village Distance Squared	29.1	58.4	9	444	30.6

**Parcels Without Single Family Homes, Camps: Categorical Variable  
Distribution Before, After Missing Data  
Estimation**

After Missing Data Estimation: 455 Parcels			Before Missing Data Estimation: 471 Total Parcels	
VARIABLE	DESCRIPTION	YES (%)	PARCELS	YES(%)
BLDG	Structure on Lot	13.3	471	13.4
BSNESLND	Land for Business Use	7.5	461	7.2
CABLE	Electricity Available	54.2	464	53.7
CROPLAND	Land Recently in Crops	4.1	461	3.8
LAKEVIEW	View if Without Frontage	14.5	438	13.8
LRFRONT	Lake or River Front	18.1	426	19.2
NEARFP	Near Forest Preserve	36.1	454	35.7
NEWOUT	Postplan, Out of Park	27.4	471	26.5
NEWTIGHT	Postplan, Res Mgmt, Rur Use	11.1	471	11.3
OLDLOOSE	Postplan, Ham-Mod-Low Use	19.5	471	18.8
OLDOUT	Preplan, Out of Park	9.3	471	9.8
OLDTIGHT	Preplan, Res Mgmt, Rur Use	9.1	471	9.3
PHONE	Phone Outlet Present	27.9	462	27.5
PORTION	Part of Larger Purchase	9.5	471	8.9
PUBSEWR	Public Sewer Service	10.0	462	9.7
RDNONE	No Road Access	7.3	467	7.5
SOUTHERN	Southeastern Counties	41.5	471	40.5
SPRINGH2O	Spring as Water Supply	9.1	461	9.1
STEEP	Steeply Sloping Lot	10.0	467	10.5
WESTERN	Western Counties	21.0	471	20.6

**Parcels With Single Family Homes: Categorical Variable Means Before  
and After Missing Data Estimation**

After Missing Data Estimation: 326 Parcels			Before Missing Data Estimation: 338 Total Parcels	
VARIABLE	DESCRIPTION	YES (%)	PARCELS	YES (%)
CABLE	Electricity Available	92.3	337	92.0
LAKEVIEW	View of Lake	9.5	320	10.0
LRFRONT	Lake or River Front	28.7	320	29.4
NEARFP	Near Forest Preserve	33.6	333	33.0
NEWOUT	Postplan, Out of Park	26.1	338	26.0
NEWTIGHT	Postplan, Rural-Res Mgmt	11.9	338	11.5
OLDLOOSE	Preplan, Ham-Mod-Low Use	13.0	338	13.2
OLDOUT	Preplan, Out of Park	10.5	338	10.4
OLDTIGHT	Preplan, Rur Use, Res Mgmt	7.0	338	6.8
OUTHOU	Outhouse or Cesspool	8.9	334	8.9
PHONE	Phone Outlet	72.9	334	71.4
RDNONE	No Road Access	1.9	338	2.0
SPRINGH2O	Drink Spring Water	8.9	333	8.3
WESTERN	Western County	21.9	338	21.6
WOODHEAT	Wood Heat	25.2	323	25.7
WOODLAND	Wood or Forest Present	37.6	335	36.7

## APPENDIX IV

Hedonic Regression Results for Parcels Without Single Family House or Camp and for Completely Undeveloped Parcels: Open Market Sales Between 1968-1983 in the Adirondack Study Region

VARIABLE	COMPLETELY UNDEVELOPED (N=283)		WITHOUT SINGLE FAMILY HOUSES OR CAMPS (N=455)	
	COEFFICIENT VALUE	STUDENT- T	COEFFICIENT VALUE	STUDENT- T
INTERCEPT	8.736*	21.77	8.642*	27.42
<u>Physical characteristics</u>				
ACRES	.033*	5.63	.028*	6.50
ACRESSQ <sup>1</sup>	-.000125*	-2.92	-.000065**	-2.51
LRFRONT (1=yes)	.891*	4.75	.672*	4.51
LAKEVIEW (1=yes)	.516**	2.50	.276***	1.66
RDNONE (1=yes)	-.611*	-2.62	-.446**	-2.00
PUBSEWR (1=yes)	.332	.72	.413**	2.01
SPRINGH20 (1=yes)	-.407***	-1.83	-.402**	-2.07
STEEP (1=yes)	-.217	-1.06	-.208	-1.16
CABLE (1=yes)	.319**	2.18	.277**	2.06
PHONE (1=yes)	.	.	.923*	5.86
CROPLAND (1=yes)	-.249	-.72	-.282	-1.04
BSNESLND (1=yes)	1.076**	2.48	.594**	2.58
BLDG (1=yes)	.	.	.437**	2.38
<u>Locational characteristics</u>				
DISHIWA (miles)	-.0003	-.09	-0.002	-.89
DISVIL (miles)	-.041	-.91	.031	.89
VILSQ	-.004	-1.43	-.003	-1.23
SOUTHERN (1=yes)	.067	.44	.111	.89
WESTERN (1=yes)	-.218	-1.14	-.239****	-1.52
NEARFP (1=yes)	.145	1.00	.248**	2.14
<u>Transaction characteristics</u>				
PORTION (1=yes)	.	.	-1.419*	-7.33

(CONTINUED NEXT PAGE)



(continued)				
VARIABLE	COMPLETELY UNDEVELOPED (N=283)		WITHOUT SINGLE FAMILY HOUSES OR CAMPS (N=455)	
	COEFFICIENT VALUE	STUDENT- T	COEFFICIENT VALUE	STUDENT- T
<u>Fiscal characteristics</u>				
TAXRATE (percent)	-.029***	-2.06	-.025**	-2.27
<u>Zoning class and time period (NEWLOOSE is base)</u>				
NEWOUT (1=yes)	.025	.12	.177	1.12
OLDOUT (1=yes)	-.150	-.53	-.118	-.55
NEWTIGHT (1=yes)	-.179	-.75	-.053	-.26
OLDTIGHT (1=yes)	.163	.66	.061	.29
OLDLOOSE (1=yes)	-.064	-.30	.228	1.37
Dependent variable: PRICE, the natural logarithm of price in 1982 dollars				
	R <sup>2</sup> =.32	ADJ-R <sup>2</sup> =.26	R <sup>2</sup> =.46	ADJ-R <sup>2</sup> =.43

N.B. A dot (.) means that the variable was not included in that model.  
See Appendix II for explanation of variable labels and Appendix  
III for a statistical description of the variables.

<sup>1</sup> These variables are the squared values of the preceding variable.

\*, \*\*, \*\*\*, \*\*\*\* The asterisks indicate the Student t-test significance levels for a two tailed test of .01, .05, .10, and .15 respectively. The statistical tests are intended to be illustrative only. It is likely that they overestimate the significance of the relationships because of the preliminary model building which was undertaken. Note that t-tests cannot legitimately be performed sequentially on a series of variables. The coefficients therefore are best interpreted as a measure of the relative strength of the relationships between prices and the variable in question. In sum, the fewer the stars and the larger the "t" value, the stronger the relationship of the variable with price and the more confidence in its importance for the land market.

## APPENDIX V

TABLE 1  
Parcels With Single Family Homes or Camps Compared by Zoning Restrictiveness  
and by Purchase Before or After Land Use Plan

VARIABLE	UNITS	OUTSIDE PARK		LOOSE CONTROLS		TIGHT CONTROLS	
		1/68- 8/73	9/73- 5/83	1/68- 8/73	9/73- 5/83	1/68- 8/73	9/73- 5/83
Parcels	No.	35	88	44	109	23	39
<u>Continuous Variables (medians)</u>							
PRICE	1982\$	32849	37731	39154	32268	16529	32000
PPERACRE	1982\$/Acre	77434	51192	57107	62334	3904	18541
PPERACR	1982\$/Acre	5237	9864	13860	10789	1881	7513
ACRES	Acres	0.4	0.6	0.7	0.5	2.3	2.3
DISVIL	Miles	3	2	3	2	5	4
DISHIWA	Miles	9.5	7.3	13.5	15	25	20
TAXRATE	\$/1000	25.5	25.8	27.2	24.2	24	22.8
CAMPS	No.	0	0	1	0	1	1
HOUSES	No.	1	1	1	1	1	0
BATHROOMS	No.	1	1	1	1	0.5	1
BEDROOMS	No.	3	3	3	3	1	2
OTHRROOMS	No.	3	3	2.5	3	2	2
SFFS	Sq. Ft.	1451	1202	1000	1200	700	1000
BLDAGE	Years	31	39	26	30	24	28
FIREPL	No.	0	0	0	0	0	0
<u>Categorical variables</u>							
PORTION	%	11.4	3.4	2.3	1.8	8.9	5.1
LRFRONT	%	17.1	14.8	56.8	27.5	34.8	30.8
LAKEVIEW	%	6.1	4.8	16.7	14.2	4.8	8.1
CABLE	%	88.6	95.5	95.5	97.2	73.9	79.5
COUNTY							
SOUTHERN	%	42.9	52.3	38.6	44.0	43.5	41.0
WESTERN	%	22.9	22.7	29.5	17.4	26.1	17.9
NORTHEST	%	34.2	25.0	31.9	38.6	30.4	41.1
NEARFP	%	20.0	13.6	40.9	40.4	52.2	43.6
PHONE	%	85.7	78.4	63.6	75.2	39.1	56.4
RDNONE	%	2.9	1.1	0	1.8	8.7	2.6
PERMRES	%	77.1	80.7	40.9	49.5	34.8	38.5

TABLE 1 (continued)

LAND USE	OUTSIDE PARK		LOOSE CONTROLS		TIGHT CONTROLS	
BSNESLND %	5.7	4.5	9.1	2.8	0	0
CROPLAND %	5.7	8.0	4.5	7.3	4.3	10.3
OTHERLND %	88.6	87.5	86.4	89.9	95.7	89.7
HOME HEAT						
WOODHEAT %	14.7	18.4	20.5	25.5	47.6	42.1
HTELEC %	2.9	10.2	9.1	19.3	4.3	15.4
HTOTHER %	82.4	71.4	70.4	55.2	48.1	42.5
SEWERAGE						
PUBSEWR %	22.9	20.5	9.1	24.8	0	0
OUTHOU %	2.9	6.8	9.1	5.5	26.1	17.9
OTHSEWR %	74.2	72.7	81.8	69.7	73.9	82.1
SPRINGH20 %	8.6	3.4	11.4	2.8	34.8	20.5
STEEP %	0	6.8	11.4	9.2	17.4	15.4
NOBROKER %	60.0	43.2	61.4	39.4	47.8	35.9
MORTGAGE?						
PAYCASH %	28.6	22.7	50.0	32.1	47.8	25.6
THRUOWNR %	8.6	10.2	13.6	22.9	13.0	38.5
OTHMTGE %	62.8	67.1	36.4	45.0	39.2	35.9
OWN MORE LAND?						
PTOUCH %	22.9	17.0	15.9	11.9	21.7	10.3
PELSEWHR %	25.7	31.8	52.3	46.8	43.5	48.7
PNONE %	51.4	51.2	31.8	41.3	34.8	41.0
OWNER AGE						
FIFTY+ %	22.9	15.9	15.9	26.6	26.1	12.8
30-49 %	57.1	51.1	75.0	54.1	52.2	66.7
OTHAGE %	20.0	33.0	9.1	19.3	21.7	20.5
SCHOOLING						
NOHSGRAD %	11.4	9.1	9.1	8.3	13.0	7.7
NOCOLGRD %	60.0	52.3	52.3	55.0	34.8	38.5
OTHGRAD %	28.6	38.6	38.6	36.7	52.2	53.8
INCOME						
INCHI %	22.9	20.5	38.6	31.2	34.8	38.5
INCMED %	45.7	53.4	36.4	43.1	26.1	43.6
INCLOW %	25.7	19.3	18.2	15.6	30.4	7.7
INCOTH %	5.7	6.8	6.8	10.1	8.7	10.2

TABLE 2

Parcels Without Single Family Houses or Camps Compared by Zoning Restrictiveness  
and by Purchase Before (1/68-8/73) or After (9/73-5/83) Land Use Plan

		<u>OUTSIDE PARK</u>		<u>LOOSE CONTROLS</u>		<u>TIGHT CONTROLS</u>	
		1/68- 8/73	9/73- 5/83	1/68- 8/73	9/73- 5/83	1/68- 8/73	9/73- 5/83
Number of Parcels		46	125	87	116	44	53
<u>VARIABLE</u>	<u>UNITS</u>						
<u>Continuous Variables (medians)</u>							
PRICE	1982\$	6637	7951	10178	7417	13274	8065
PPERACRE	1982\$/Acre	2226	5061	11309	9271	653	808
PPERACR	1982\$/Acre	821	842	1343	3158	296	632
(if > one acre)							
ACRES	Acres	1.5	1	0.8	0.7	13	7
DISVIL	Miles	3	3	3	2.5	5	4
DISHIWA	Miles	10	7	14	11	13	12
TAXRATE	\$/1000	28.5	26.4	24.2	23.2	24.3	25.4
<u>Categorical Variables</u>							
PORTION	%	8.7	7.2	9.2	11.2	6.8	9.4
LRFRONT	%	15.2	8.0	33.3	20.7	22.7	7.5
LAKEVIEW	%	8.9	6.9	13.9	17.9	12.2	23.4
CABLE	%	53.3	54.4	59.3	63.8	30.2	43.4
COUNTY							
SOUTHERN	%	32.6	46.4	48.3	31.9	43.2	37.7
WESTERN	%	30.4	26.4	20.7	19.0	13.6	7.5
NORTHEST	%	37.0	27.2	21.0	49.1	43.2	54.8
NEARFP	%	32.6	23.2	36.8	38.8	40.9	43.4
PHONE	%	39.1	32.0	27.6	28.4	11.4	15.1
RDNONE	%	6.5	5.6	7.0	5.2	13.6	11.3
LAND USE							
LNDBUS	%	4.3	8.0	12.6	7.8	2.3	1.2
LND CROP	%	6.5	2.4	2.3	2.6	4.5	11.3
LNDOTHER	%	89.2	89.6	85.1	89.6	93.2	87.5

TABLE 2 Continued

		OUTSIDE PARK		LOOSE CONTROLS		TIGHT CONTROLS	
SEWERAGE							
PUBSEWR	%	6.5	12.0	13.8	12.9	0	0
OUTHOU	%	8.7	3.2	12.6	9.5	6.8	7.5
OTHSEWR	%	84.8	84.8	73.6	77.6	93.2	2.5
SPRINGH20	%	13.0	6.4	5.7	3.4	18.2	20.8
STEEP	%	8.7	5.6	8.0	12.7	20.5	15.1
NOBROKER	%	76.1	63.2	58.6	68.1	63.6	64.2
MORTGAGE							
PAYCASH	%	52.2	58.4	55.2	56.9	68.2	71.7
THRUOWNR	%	10.9	13.6	19.5	21.6	13.6	17.0
OTHMTGE	%	36.9	28.0	25.3	21.5	18.2	11.3
PERMRES	%	69.6	71.2	37.9	41.3	34.1	52.8
OWN MORE LAND?							
PTOUCH	%	28.3	28.0	29.9	26.7	32.6	22.6
PELSEWHR	%	34.8	24.8	43.7	37.9	47.7	37.7
POTHER	%	36.9	47.2	26.4	35.4	19.7	39.7
OWNER AGE							
FIFTY+	%	19.6	20.8	24.1	31.0	15.9	13.2
30-49	%	41.3	41.6	56.3	49.1	65.9	60.4
OTHAGE	%	39.1	38.6	19.6	19.9	19.2	26.4
SCHOOLING							
NOHSGRAD	%	17.4	13.6	16.1	9.5	11.4	15.1
NOCOLGRD	%	69.6	52.8	49.4	44.8	45.5	37.7
OTHGRAD	%	13.0	33.6	34.5	45.7	43.1	47.2
INCOME							
INCHI	%	15.2	15.2	26.4	25.9	38.6	20.8
INCMED	%	37.0	51.2	42.5	46.6	38.6	41.5
INCLOW	%	26.1	18.4	11.5	15.5	11.4	15.1
OTHINC	%	21.7	15.2	19.6	12.0	11.4	32.6

## APPENDIX VI

Numbers of sample parcels bought on open market, by land use class, for periods before and after Land Use Plan

Land Class	Before Plan (1/68-8/73)	After Plan (9/73-3/83)
Hamlet		
included house	11	47
no house	27	36
Moderate Intensity		
included house	21	40
no house	28	42
Low Intensity		
included house	10	19
no house	29	38
Rural Use		
included house	19	33
no house	32	32
Resource Management		
included house	6	8
no house	15	22
Outside of Park		
included house	35	88
no house	46	124

## APPENDIX VII

NOTE: Data covers all parcels in Adirondacks, not just those acquired after 1967.

